CPT103 Coursework Report

# Must Read

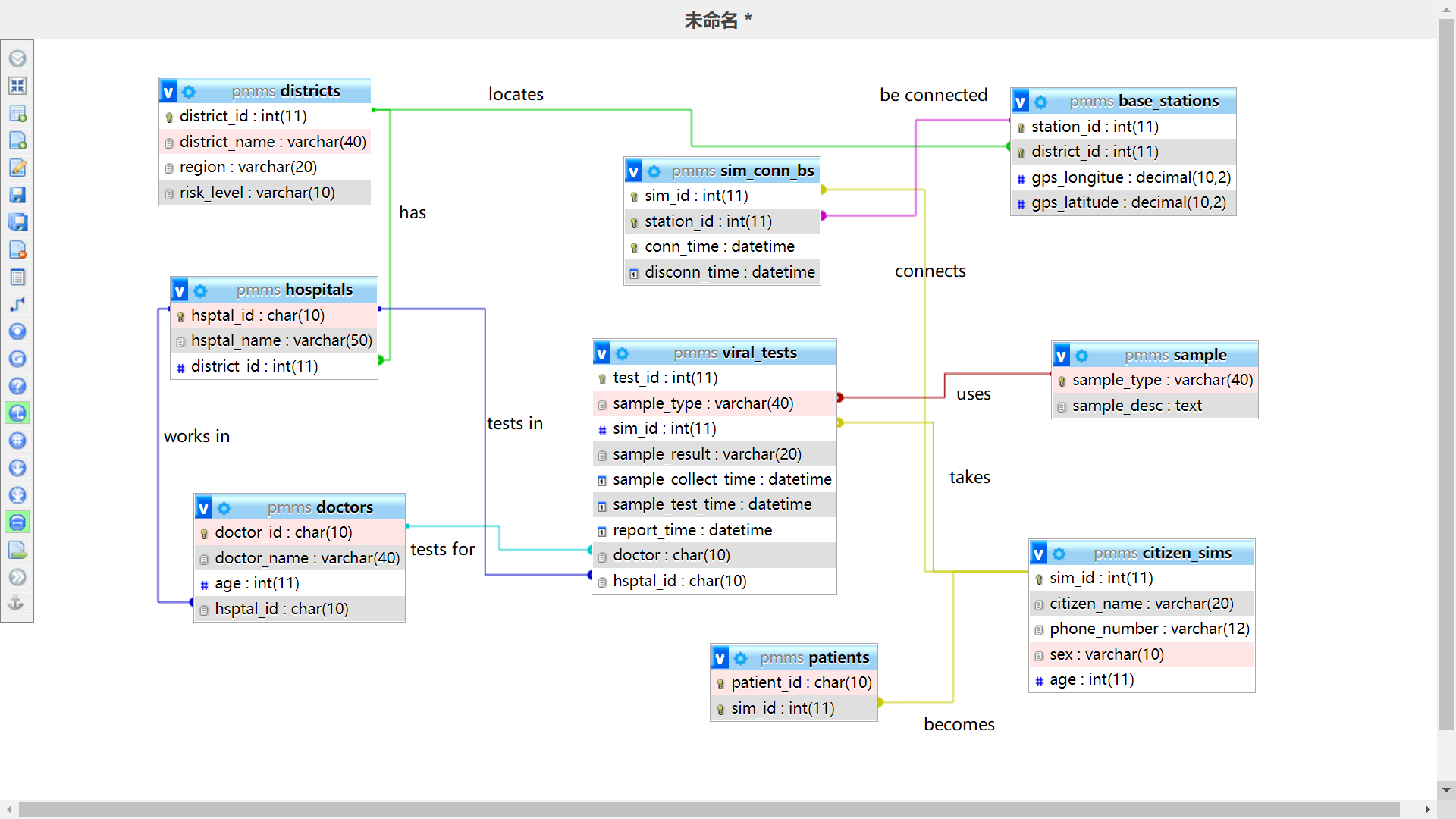
Your report and database design must be your own work. You should not copy any code from others or let anyone develop this PMMS. Plagiarism and collusion lead to a zero mark for this coursework.

All tables must be in 3NF and the ER diagram should not contain any M: N relationships. Please strictly follow the structure of this template. Remember to double-check grammar and wording errors so that the report could be understood easily. Failing to do so will result in mark deductions. Any language other than English will be ignored when marking the report.

Your ID:

Name:

Email Address:



# Database Design Details

## Tables

In this section, you are required to explain all of the tables in your ER diagram. An example is given below. Please make sure you follow the template and everything is clearly explained.

------ The Beginning of the Example ------

[This is only an example. You don’t have to follow the same way I explained this table, but your explanation should be clear and detailed]

Table name: Staff

Table design general explanation:

The staff table is used to store the information of all staff members in the company. The primary key is staff\_id as it is unique for every staff member. [Add more explanations if you made some special considerations. Try to support your assumptions with proofs in real life]

Attributes:

|  |  |  |
| --- | --- | --- |
| Column Definition | Domain | Explanation |
| staff\_age int | 18+ | The age of staff members. The value should be larger than 18 because of the government law. This domain is checked by the domain constraint called XXXX. |
| address varchar(255) | Room *XX*, Building *YY*, *ZZ* Road, *WW* district | The address of the office, the data cannot be checked by the database directly. As a result, manual checking is required when entering data. |
| Staff\_name varchar(100) | All valid names are acceptable. For example, ‘Jun Qi’. | The name of staff members. |
| Branch\_no char(4) | Branch numbers start with B followed by 3 digits. For example, ‘b003’ | The branch number where this staff works in |
| Staff\_email varchar(255) | Valid email addresses  XXX@YYY.ZZZ | The correctness of email addresses cannot be checked directly by the database, so manual checking is required.  This column is not UNIQUE. It is an intentional design because the company sometimes offer shared email addresses for one office to improve communications. |
| Staff\_id int primary key | 2003001 | The staff id must be 7 numbers long and follow the format XXXYYYY, where XXX refers to the branch of that staff and YYYY is the individual unique number of that staff. |

Foreign keys:

The column Branch\_no references branch.branch\_no, this is to make sure that branch\_no are valid numbers that reflect existing branches of the company. It corresponds to the XXX relationship in the ER diagram.

------ The End of the Example ------

Table name: districts

Table design explanation

The district table is used to store the information of all districts in the PMMS database. The primary key is district\_id as it is unique for every district.

Attributes:

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| district\_id | int primary key | numbers used to identified a district | The id of the districts. The value should start from 1 and increased by 1. |
| district\_name | varchar(40) | All valid names are accepted, such as “Centre Lukewarm Hillside” | The name of districts. |
| region | varchar(20) | Five valid regions are: east, west, south, north, central. | The region area of a district that located in. |
| risk\_level | varchar(10) | Three valid risk levels are: high, low, mid | The risk levels of the districts. |

Foreign keys and reasons:

The districts table doesn’t have foreign keys.

Table name: hospitals

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| hsptal\_id | char(10) primary key | Hospital number start with ‘HSPT‘ followed by numbers, for example: HSPT00001 | the identity of hospital. The value starts from HSPT00001. |
| hsptal\_name | varchar(50) | All valid names are accepted. Such as “Central Lukewarm Kingdom Hospital”. | The name of hospital. |
| district\_id | int | the id of districts, which is referenced district.district\_id. | The id of the districts. |

Foreign keys and reasons:

district\_id

The column district\_id references districts.district\_id, this is to make sure that district\_id are valid numbers that reflect existing districts. It corresponds to the has relationship in the ER diagram.

Table name: doctors

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| doctor\_id | char(10) primary key | Doctor number start with ‘DT‘ followed by numbers, for example: DT0001 | the identity of doctor. The value starts from DT0001. |
| doctor\_name | varchar(40) | All valid names are accepted. Such as “Jun Qi”. | The name of doctors. |
| age | int | all valid age are accepted, it should starts from 20 and less than 70. | The age of doctors. |
| hsptal\_id | int | the id of hosipitals, which is referenced hospitals.hsptal\_id | The id of the hospitals. |

Foreign keys and reasons:

hsptal\_id

The column hospital\_id references hospitals.hsptal\_id, this is to make sure that hsptal\_id are valid numbers that reflect existing hospitals. It corresponds to the works in relationship in the ER diagram.

Table name: base\_stations.

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| station\_id | int primary key | base station number, which is starts from 1. | the identity of base\_stations.The value starts from 1. |
| district\_id | int | the id of districts, which is referenced district.district\_id. | The id of the districts. |
| gps\_longitue | decimal(10,2) | All valid gps longitude are accepted. | The longitude of the base stations. |
| gps\_latitude | decimal(10,2) | All valid gps latitude are accepted. | The latitude of the base stations. |

Foreign keys and reasons:

district\_id

The column district\_id references districts.district\_id, this is to make sure that district\_id are valid numbers that reflect existing districts. It corresponds to the locates relationship in the ER diagram.

Table name: citizen\_sims

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| sim\_id | int primary key | the sim ids of citizens. It is unique determines a citizen and a phone number. | the identity of citizen sims. The value starts from 1. |
| citizen\_name | varchar(20) | All valid citizen names are accepted. | The name of the citizens. |
| phone\_number | varchar(12 | All valid phone number are accepted. It is unique. | The phone number of the citizens. |
| sex | varchar(10) | Female and Male are accepted. | Sex of the citizens. |
| age | int | all valid age are accepted, it should starts from 1 and less than 70. | Age of the citizens. |

Foreign keys and reasons:

The citizen\_sims table doesn’t have foreign keys.

Table name: sim\_conn\_bs

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| sim\_id | int | the sim ids of citizens. It is unique determines a citizen and a phone number. | the identity of citizen sims. The value starts from 1. |
| station\_id | int | base station number, which is starts from 1. | the identity of base\_stations.The value starts from 1. |
| conn\_time | datetime | the sim connects base stations time. All valid time can be accepted. The format is: ‘YYYY-MM-DD HH:mm:ss’. | the sim connects base stations time. |
| disconn\_time | datetime | the sim disconnects base stations time. All valid time can be accepted. The format is: ‘YYYY-MM-DD HH:mm:ss’. | the sim disconnects any base stations time. |

Foreign keys and reasons:

sim\_id and station\_id are foreign keys.

The column sim\_id references citizen\_sims(sim\_id), this is to make sure that sim\_id are valid numbers that reflect existing citizens’ sim id. It corresponds to the connects relationship in the ER diagram.

The column station\_id references base\_stations(station\_id), this is to make sure that station\_id are valid numbers that reflect existing base stations. It corresponds to the “be connected” relationship in the ER diagram.

Table name: patients

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| patient\_id | char(10) primary key | The id of patients. if a citizen is infected it will generate a patient\_id. Patient\_id starts from ‘p0001’. | the identity of patients. The value starts from ‘p0001’. |
| sim\_id | int | the sim ids of citizens. It is unique determines a citizen and a phone number. | the identity of citizen sims. The value starts from 1. |

Foreign keys and reasons:

sim\_id is foreign key.

The column sim\_id references citizen\_sims(sim\_id), this is to make sure that sim\_id are valid numbers that reflect existing citizens’ sim id. It corresponds to the becomes relationship in the ER diagram.

Table name: sample

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| sample\_type | varchar(40) primary key | The type of sample, which is unique determines a sample. All valid sample type are all accepted. | the identity of samples. |
| sample\_desc | text | the sample description which is used to describe sample more clearly. | sample description used to describe sample type. Such as “Coughid-21 is a newly identified type of virus this year, all patients tested to be positive should rest well and avoid going outside” |

Foreign keys and reasons:

The sample table doesn’t have a foreign key.

Table name: viral\_tests

Table design explanation

|  |  |  |  |
| --- | --- | --- | --- |
| Column Definition | | Domain | Explanation |
| test\_id | int primary key | the id of viral tests, which is unique determines a viral test, and starts from 1. | the identity of viral tests. |
| sample\_type | varchar(40) primary key | The type of sample, which is unique determines a sample. The sample type is references sample entity. | the identity of samples. |
| sim\_id | int | the sim ids of citizens. It is unique determines a citizen and a phone number. | the identity of citizen sims. The value starts from 1. |
| sample\_result | varchar(20) | the result of viral tests. There are two results: positive and negative. | the result of viral tests. |
| sample\_collect\_time | datetime | the sample collect time. All valid time can be accepted. The format is: ‘YYYY-MM-DD HH:mm:ss’. | the sample collect time. |
| sample\_test\_time | datetime | the test time of viral test. All valid time can be accepted. The format is: ‘YYYY-MM-DD HH:mm:ss’. | the test time of viral test. |
| report\_time | datetime | the report time of viral test. All valid time can be accepted. The format is: ‘YYYY-MM-DD HH:mm:ss’. | the report time of viral test. |
| doctor | char(10) primary key | Doctor number start with ‘DT‘ followed by numbers, for example: DT0001 | the identity of doctor. The value starts from DT0001. |
| hsptal\_id | char(10) primary key | Hospital number start with ‘HSPT‘ followed by numbers, for example: HSPT00001 | the identity of hospital. The value starts from HSPT00001. |

Foreign keys and reasons:

foreign key (sim\_id) references citizen\_sims(sim\_id),

foreign key (doctor) references doctors(doctor\_id),

foreign key (sample\_type) references sample(sample\_type),

foreign key (hsptal\_id) references hospitals(hsptal\_id).

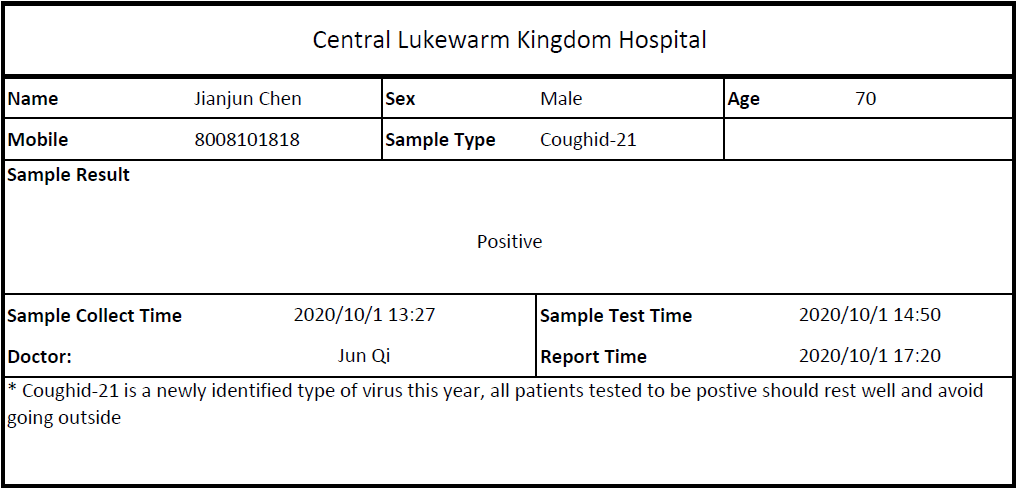
The column sim\_id references citizen\_sims(sim\_id), this is to make sure that sim\_id are valid numbers that reflect existing citizens’ sim id. It corresponds to the takes relationship in the ER diagram.

The column doctor references doctors.doctor\_id, this is to make sure that doctor are valid that reflect existing doctors. It corresponds to the “tests for” relationship in the ER diagram.

The column sample\_type references sample.sample\_type, this is to make sure that sample\_type are valid that reflect existing sample. It corresponds to the uses relationship in the ER diagram.

The column hospital\_id references hospitals.hsptal\_id, this is to make sure that hsptal\_id are valid numbers that reflect existing hospitals. It corresponds to the “tests in” relationship in the ER diagram.

## Viral Test Report – Normalisation Process



Please write down the detailed normalisation process for the viral test report. Firstly, identify all attributes you can find in the viral test report as well as in the specifications (you need to add your own attributes if your database design has them). Then, at each normalisation stage, list all functional dependencies and normalise them to the higher normal form. 3NF is required for the final tables and must match your ER diagram.

**Stage 1**

**Attributes**:

citizen\_name, sex, age, phone\_number, sim\_id,

sample\_type, sample\_result, sample\_collect\_time, sample\_test\_time, report\_time, sample\_desc,

hsptal\_id, hsptal\_name, district\_id, district\_name, region, risk\_level,

doctor\_id, age, doctor\_name,

station\_id, gps\_longitude, gps\_latitude,

conn\_time, disconn\_time,

patient\_id,

test\_id

**FDs (Indicate partial or transitive dependencies)**:

sim\_id-> citizen\_name, sex, age, phone\_number

hsptal\_id-> district\_id, hsptal\_name, district\_name,region,risk\_level

district\_id -> district\_name, region, risk\_level

doctor\_id->doctor\_name, age, hsptal\_id, district\_id, hsptal\_name, district\_name,region,risk\_level

station\_id->gps\_longitute, gps\_latitude, district\_id, district\_name,region,risk\_level

sim\_id, station\_id->conn\_time, disconn\_time

patient\_id->sim\_id

sample\_type->sample\_desc

test\_id -> sample\_type, sample\_desc , sim\_id, citizen\_name, sex, age, phone\_number, sample\_result, sample\_collect\_time, sample\_test\_time, report\_time, doctor\_id, doctor\_name, age, hsptal\_id, district\_id, hsptal\_name, district\_name, region, risk\_level

**Normalised tables and which normal form they are currently in**:

hospitals (hsptal\_id, hsptal\_name, district\_id ,district\_name,region,risk\_level )

base\_stations (station\_id, gps\_longitute, gps\_latitude, district\_id, district\_name,region,risk\_level )

doctors (doctor\_id, doctor\_name, age, hsptal\_id, hsptal\_name, district\_id ,district\_name,region,risk\_level )

citizen\_sims (sim\_id, citizen\_name, sex, age, phone\_number)

patients (patient\_id, sim\_id)

sample (sample\_type, sample\_desc)

sim\_conn\_bs ( sim\_id, station\_id, conn\_time, disconn\_time)

**Stage 2**

**Attributes**:

citizen\_name, sex, age, phone\_number, sim\_id,

sample\_type, sample\_result, sample\_collect\_time, sample\_test\_time, report\_time, sample\_desc,

hsptal\_id, hsptal\_name, district\_id, district\_name, region, risk\_level,

doctor\_id, age, doctor\_name,

station\_id, gps\_longitude, gps\_latitude,

conn\_time, disconn\_time,

patient\_id,

test\_id

**FDs (Indicate partial or transitive dependencies)**:

district\_id -> district\_name, region, risk\_level

sim\_id-> citizen\_name, sex, age, phone\_number

hsptal\_id-> district\_id, hsptal\_name

doctor\_id->doctor\_name, age, hsptal\_id

station\_id->gps\_longitute, gps\_latitude, district\_id

sim\_id, station\_id->conn\_time, disconn\_time

patient\_id->sim\_id

sample\_type->sample\_desc

test\_id -> sample\_type, sim\_id, sample\_result, sample\_collect\_time, sample\_test\_time, report\_time, doctor\_id, hsptal\_id

**Normalised tables and which normal form they are currently in**:

districts (district\_id ,district\_name,region,risk\_level )

hospitals (hsptal\_id, hsptal\_name, district\_id)

base\_stations (station\_id, gps\_longitute, gps\_latitude, district\_id )

doctors (doctor\_id, doctor\_name, age, hsptal\_idl)

citizen\_sims (sim\_id, citizen\_name, sex, age, phone\_number)

patients (patient\_id, sim\_id)

sample (sample\_type, sample\_desc)

sim\_conn\_bs ( sim\_id, station\_id, conn\_time, disconn\_time)

viral\_tests (test\_id, sample\_type, sim\_id, sample\_result, sample\_collect\_time, sample\_test\_time, report\_time, doctor\_id, hsptal\_id, district\_id)

# Use Cases

Remember to put all of your SQL statements into the SQL script file, including all SELECT statements and INSERT statements used to insert test data.

## Important Use Cases

This section lists some very important use cases of the PMMS. Your database design is expected to satisfy all of these use cases. Keep in mind that all use cases below should be achieved with a single SELECT statement (unless specified otherwise, sub-queries in a query is not counted as another query). Do not ignore the “explanation” or “proof” parts of this section, as they constitute the majority of your marks. If the SQL keywords/functions you learned cannot achieve these tasks, you are allowed to self-study some other keywords and use them. The example below is very simple and requires a short paragraph of explanation. But your answers should be more detailed.

------ The Beginning of the Example ------

***Use case 0***: Write a query to list all staff members in ‘B007’. In the result, list staff names.

Your SQL statement:

SELECT staff\_name FROM staff NATURAL JOIN branch where branch.branch\_no = 'B007'

Test data and explanation:

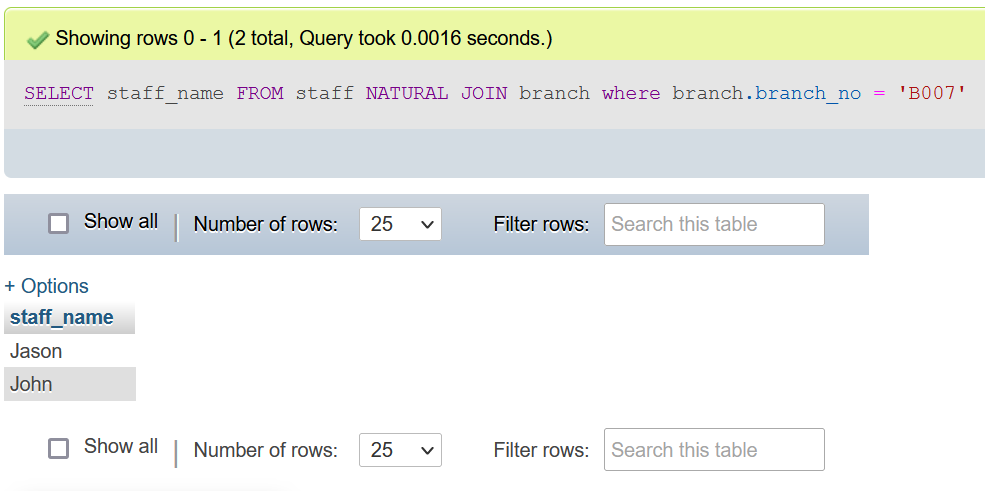
The following staff member information is added to the staff table (some attributes are hidden as they are not related to this task)

|  |  |
| --- | --- |
| Staff\_name | Branch\_no |
| ‘Jason’ | ‘B007’ |
| ‘Anna’ | ‘B002’ |
| ‘John’ | ‘B007’ |

The corresponding branch numbers ‘B007’ and ‘B002’ have already been added to the branch table.

This test data set contains staff members that are in ‘B007’ and not in ‘B007’. The expected result of the query should only contain staff in ‘B007’. Staff in other branches should be properly filtered out. For this test to work, all existing data in staff and branch need to be deleted first.

The result of the SELECT statement (screenshot):



Both the SQL statement and results must appear in the same screenshot!

------ The End of the Example ------

### Use case 1

Use case 1: A person can potentially get infected if he was in the same district with someone. The government requires that, if someone is tested to be positive, all people in the same district as him in the past 48 hours (before the positive report is published) need to take viral tests. Assume that a person called Mark was tested to be positive at 19:30 on 09-Oct-2021. Mark’s telephone number is 233636. Please write a query that can get the phone numbers of all citizens who will potentially get infected because of him.

Your SQL statement:

select scb.station\_id,

cs2.phone\_number

from citizen\_sims cs

join sim\_conn\_bs scb on scb.sim\_id=cs.sim\_id

join viral\_tests vt on vt.sim\_id=cs.sim\_id

join sim\_conn\_bs scb2 on scb.station\_id=scb2.station\_id

join citizen\_sims cs2 on cs2.sim\_id=scb2.sim\_id and scb2.sim\_id!=scb.sim\_id

where vt.report\_time='2021-10-09 19:30:00' and cs.phone\_number='233636'

and vt.sample\_result='positive';

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following base stations information is added to the base\_stations table.

|  |  |  |  |
| --- | --- | --- | --- |
| station\_id | district\_id | gps\_longitude | gps\_latitude |
| 201 | 1 | 8923.23 | 3231.32 |
| 202 | 2 | 323.21 | 2121.32 |
| 203 | 3 | 2132.43 | 1321.43 |
| 204 | 4 | 3231.13 | 3123.34 |
| 205 | 5 | 13223.1 | 32321.1 |
| 206 | 6 | 8430.32 | 42342.2 |
| 207 | 7 | 8431.32 | 42343.2 |
| 208 | 8 | 8432.32 | 42344.2 |
| 209 | 9 | 8433.32 | 42345.2 |
| 210 | 10 | 8434.32 | 42346.2 |
| 211 | 11 | 8435.32 | 42347.2 |
| 212 | 12 | 8436.32 | 42348.2 |
| 213 | 13 | 8437.32 | 42349.2 |
| 214 | 14 | 8438.32 | 42350.2 |
| 215 | 15 | 8439.32 | 42351.2 |
| 216 | 16 | 8440.32 | 42352.2 |
| 217 | 17 | 8441.32 | 42353.2 |
| 218 | 18 | 8442.32 | 42354.2 |
| 219 | 19 | 8443.32 | 42355.2 |
| 220 | 20 | 8444.32 | 42356.2 |
| 221 | 21 | 8445.32 | 42357.2 |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

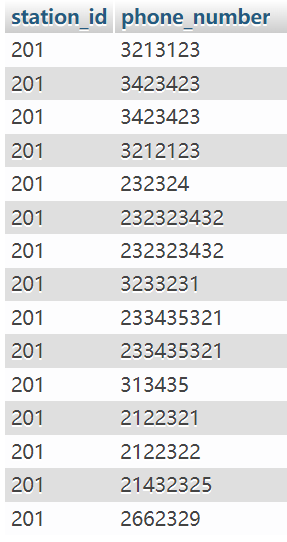
The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding citizen ‘Mark’ and phone number ‘233636’ have already been added to the citizen\_sims table. And his viral test information <2, Coughid-21, 1001,positive,2021/10/9 10:30, 2021/10/9 14:30, 2021/10/9 19:30, DT0001,HSPT00001> has also been added to viral\_tests table. And some other information such as other citizen information, and connection to base stations all add to table citizen\_sims and sim\_conn\_bs.

Use base\_stations table and citizen\_sims table and viral\_tests table and sim\_conn\_bs table get the query result.

The result of the SELECT statement (screenshot):



### Use case 2

Use case 2: Please first clearly describe the format of GPS locations. The format must be a valid format that is used in real life. Then mimic what happens to your database when a user moves into the range of a base station and then moves out one hour later by listing all SQL statements involved in the process.

The GPS format and where did you learn it from (show the website link or the screenshot of the book):

GPS has several formats, such as GPRMC, GPGGA and GPGSV etc. I learned it from the website: http://www.360doc.com/content/14/0629/23/16043777\_390851918.shtml

For simplicity, I use longitude and latitude to represent a location of a base station. And the format of longitude and latitude are both use decimal(10,2).

Your SQL statement(s) for travel record insertion:

INSERT INTO sim\_conn\_bs VALUES (1020, 204, '2021-12-05 13:00:00', null);

INSERT INTO sim\_conn\_bs VALUES (1021, 204, '2021-12-05 14:00:00', null);

UPDATE sim\_conn\_bs SET disconn\_time='2021-12-05 14:00:00' WHERE sim\_id=1020 AND station\_id=204 AND conn\_time='2021-12-05 13:00:00';

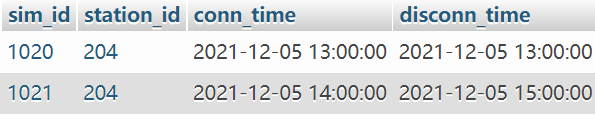
UPDATE sim\_conn\_bs SET disconn\_time='2021-12-05 15:00:00' WHERE sim\_id=1021 AND station\_id=204 AND conn\_time='2021-12-05 14:00:00';

Explain: after insertion, the sim\_conn\_bs table like as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1020 | 204 | 2021/12/5 13:00 |  |
| 1021 | 204 | 2021/12/5 14:00 |  |

The result of the SELECT statements (screenshot

select \* from sim\_conn\_bs where sim\_id in (1020,1021) and station\_id=204;



### Use case 3

Use case 3: The Lukewarm Kingdom wants to find out the hospitals that can do viral tests efficiently. The report generation time is calculated using (report time - sample test time). Please write a query to find out which hospital has the least average report generation time.

Your SQL statement:

select h.hsptal\_id, h.hsptal\_name,

avg(timestampdiff(hour,vt.sample\_test\_time,vt.report\_time)) as avg\_report\_gen\_time

from viral\_tests vt join hospitals h on h.hsptal\_id=vt.hsptal\_id

group by h.hsptal\_id, h.hsptal\_name;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following hospitals information is added to the hospitals table.

|  |  |  |
| --- | --- | --- |
| hsptal\_id | hsptal\_name | district\_id |
| HSPT00001 | Central Lukewarm Kingdom Hospital | 1 |
| HSPT00002 | North Lukewarm Kingdom Hospital | 2 |
| HSPT00003 | People of Lukewarm Kingdom Hospital | 1 |
| HSPT00004 | Luis Hospital | 2 |
| HSPT00005 | FWW Hospital | 3 |
| HSPT00006 | Williams Hospital | 4 |
| HSPT00007 | R1 Hostpital | 5 |
| HSPT00008 | R2 Hostpital | 6 |
| HSPT00009 | R3 Hostpital | 7 |
| HSPT00010 | R4 Hostpital | 8 |
| HSPT00011 | R5 Hostpital | 9 |
| HSPT00012 | R6 Hostpital | 10 |

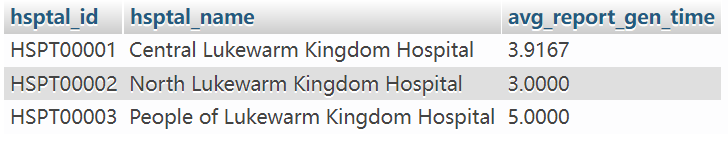
The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding hospitals information has been added to hospitals table and viral tests information has also been added to viral\_tests table.

Use hospitals table and viral\_tests table join then get the query result.

The result of the SELECT statement (screenshot):



### Use case 4

Use case 4: List the phone numbers of all citizens who did two viral tests with the time window from 2021-10-03 00:00 to 2021-10-05 00:00. The two viral tests must have a gap time of at least 24 hours (at least 24 hours apart).

Your SQL statement:

select cs.phone\_number

from citizen\_sims cs join viral\_tests vt on vt.sim\_id=cs.sim\_id

where sample\_test\_time between '2021-10-03 00:00' and '2021-10-05 00:00'

group by cs.phone\_number

having count(vt.test\_id)>=2;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following viral tests information is added to the viral\_tests table.

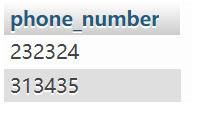
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding citizen sims information has been added to citizen\_sims table and viral tests information has also been added to viral\_tests table.

Explain:

Use citizen\_sims table and viral\_tests table join then get the query result.

The result of the SELECT statement (screenshot):



### Use case 5

Use case 5: List the high-risk, mid-risk and low-risk districts using one query. High-risk districts should be listed first, followed by mid-risk districts and then low-risk districts. Example:

|  |  |
| --- | --- |
| **district\_name** | **risk\_level** |
| Centre Lukewarm Hillside | high |
| Lenny town | high |
| Glow Sand district | mid |
| Raspberry town | low |
| Bunny Tail district | low |

The following districts information is added to the districts table.

|  |  |  |  |
| --- | --- | --- | --- |
| district\_id | district\_name | region | risk\_level |
| 1 | Centre Lukewarm Hillside | central | high |
| 2 | Lenny town | north | high |
| 3 | Glow Sand district | east | high |
| 4 | Raspberry town | central | mid |
| 5 | Bunny Tail district | north | low |
| 6 | Luckwam distrct 6 | central | low |
| 7 | Luckwam distrct 7 | east | low |
| 8 | Luckwam distrct 8 | south | low |
| 9 | Luckwam distrct 9 | north | low |
| 10 | Luckwam distrct 10 | west | low |
| 11 | Luckwam distrct 11 | central | low |
| 12 | Luckwam distrct 12 | south | low |
| 13 | Luckwam distrct 13 | north | low |
| 14 | Luckwam distrct 14 | west | low |
| 15 | Luckwam distrct 15 | south | low |
| 16 | Luckwam distrct 16 | central | low |
| 17 | Luckwam distrct 17 | west | low |
| 18 | Luckwam distrct 18 | central | low |
| 19 | Luckwam distrct 19 | west | low |
| 20 | Luckwam distrct 20 | west | low |
| 21 | Luckwam distrct 21 | central | low |

Your SQL statement:

select d.district\_name, d.risk\_level

from districts d join base\_stations bs on d.district\_id=bs.district\_id

where d.risk\_level='high'

union

select d.district\_name, d.risk\_level

from districts d join base\_stations bs on d.district\_id=bs.district\_id

where d.risk\_level='mid'

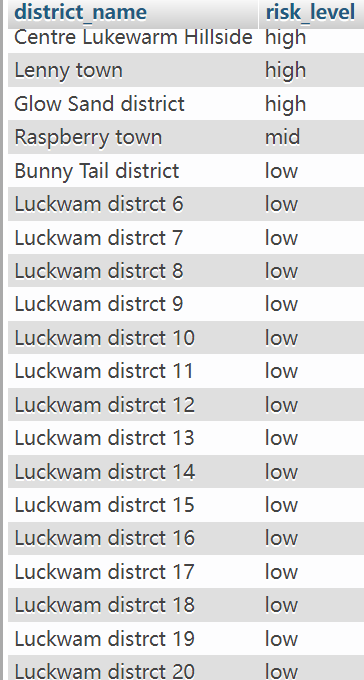
union

select d.district\_name, d.risk\_level

from districts d join base\_stations bs on d.district\_id=bs.district\_id

where d.risk\_level='low';

The result of the SELECT statement (screenshot):



### Use case 6

Use case 6: List all positive cases found in the district called “Centre Lukewarm Hillside” on 2021-10-04. The result should include the names and phone numbers of people tested to be positive.

Your SQL statement:

select cs.citizen\_name, cs.phone\_number

from districts d join base\_stations bs on bs.district\_id=d.district\_id

join sim\_conn\_bs scb on scb.station\_id=bs.station\_id

join viral\_tests vt on vt.sim\_id=scb.sim\_id

join citizen\_sims cs on cs.sim\_id=vt.sim\_id

where d.district\_name='Centre Lukewarm Hillside'

and vt.sample\_result='positive'

and vt.report\_time like '2021-10-04%';

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following districts information is added to the districts table.

|  |  |  |  |
| --- | --- | --- | --- |
| district\_id | district\_name | region | risk\_level |
| 1 | Centre Lukewarm Hillside | central | high |
| 2 | Lenny town | north | high |
| 3 | Glow Sand district | east | high |
| 4 | Raspberry town | central | mid |
| 5 | Bunny Tail district | north | low |
| 6 | Luckwam distrct 6 | central | low |
| 7 | Luckwam distrct 7 | east | low |
| 8 | Luckwam distrct 8 | south | low |
| 9 | Luckwam distrct 9 | north | low |
| 10 | Luckwam distrct 10 | west | low |
| 11 | Luckwam distrct 11 | central | low |
| 12 | Luckwam distrct 12 | south | low |
| 13 | Luckwam distrct 13 | north | low |
| 14 | Luckwam distrct 14 | west | low |
| 15 | Luckwam distrct 15 | south | low |
| 16 | Luckwam distrct 16 | central | low |
| 17 | Luckwam distrct 17 | west | low |
| 18 | Luckwam distrct 18 | central | low |
| 19 | Luckwam distrct 19 | west | low |
| 20 | Luckwam distrct 20 | west | low |
| 21 | Luckwam distrct 21 | central | low |

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following base stations information is added to the base\_stations table.

|  |  |  |  |
| --- | --- | --- | --- |
| station\_id | district\_id | gps\_longitude | gps\_latitude |
| 201 | 1 | 8923.23 | 3231.32 |
| 202 | 2 | 323.21 | 2121.32 |
| 203 | 3 | 2132.43 | 1321.43 |
| 204 | 4 | 3231.13 | 3123.34 |
| 205 | 5 | 13223.1 | 32321.1 |
| 206 | 6 | 8430.32 | 42342.2 |
| 207 | 7 | 8431.32 | 42343.2 |
| 208 | 8 | 8432.32 | 42344.2 |
| 209 | 9 | 8433.32 | 42345.2 |
| 210 | 10 | 8434.32 | 42346.2 |
| 211 | 11 | 8435.32 | 42347.2 |
| 212 | 12 | 8436.32 | 42348.2 |
| 213 | 13 | 8437.32 | 42349.2 |
| 214 | 14 | 8438.32 | 42350.2 |
| 215 | 15 | 8439.32 | 42351.2 |
| 216 | 16 | 8440.32 | 42352.2 |
| 217 | 17 | 8441.32 | 42353.2 |
| 218 | 18 | 8442.32 | 42354.2 |
| 219 | 19 | 8443.32 | 42355.2 |
| 220 | 20 | 8444.32 | 42356.2 |
| 221 | 21 | 8445.32 | 42357.2 |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding citizen sims information has been added to citizen\_sims table and viral tests information has also been added to viral\_tests table. And stations information, citizen\_sims information are also added to stations table and citizen\_sims table.

The result of the SELECT statement (screenshot):



### Use case 7

Use case 7: Calculate the increase in new positive cases in the district called “Centre Lukewarm Hillside” on 2021-10-05 compared to 2021-10-04. The result should show a single number indicating the increment. If there are fewer new positive cases than yesterday, this number should be negative.

Your SQL statement:

select t1.district\_id, t1.district\_name, t2.positive\_num-t1.positive\_num as increment

from

(

select d.district\_id, d.district\_name, count(distinct cs.sim\_id) as positive\_num

from districts d join base\_stations bs on bs.district\_id=d.district\_id

join sim\_conn\_bs scb on scb.station\_id=bs.station\_id

join viral\_tests vt on vt.sim\_id=scb.sim\_id

join citizen\_sims cs on cs.sim\_id=vt.sim\_id

where d.district\_name='Centre Lukewarm Hillside'

and vt.sample\_result='positive'

and vt.report\_time like '2021-10-04%'

group by d.district\_id, d.district\_name

) t1

join

(

select d.district\_id, d.district\_name, count(distinct cs.sim\_id) as positive\_num

from districts d join base\_stations bs on bs.district\_id=d.district\_id

join sim\_conn\_bs scb on scb.station\_id=bs.station\_id

join viral\_tests vt on vt.sim\_id=scb.sim\_id

join citizen\_sims cs on cs.sim\_id=vt.sim\_id

where d.district\_name='Centre Lukewarm Hillside'

and vt.sample\_result='positive'

and vt.report\_time like '2021-10-05%'

group by d.district\_id, d.district\_name

) t2 on t1.district\_id=t2.district\_id and t1.district\_name=t2.district\_name

;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following districts information is added to the districts table.

|  |  |  |  |
| --- | --- | --- | --- |
| district\_id | district\_name | region | risk\_level |
| 1 | Centre Lukewarm Hillside | central | high |
| 2 | Lenny town | north | high |
| 3 | Glow Sand district | east | high |
| 4 | Raspberry town | central | mid |
| 5 | Bunny Tail district | north | low |
| 6 | Luckwam distrct 6 | central | low |
| 7 | Luckwam distrct 7 | east | low |
| 8 | Luckwam distrct 8 | south | low |
| 9 | Luckwam distrct 9 | north | low |
| 10 | Luckwam distrct 10 | west | low |
| 11 | Luckwam distrct 11 | central | low |
| 12 | Luckwam distrct 12 | south | low |
| 13 | Luckwam distrct 13 | north | low |
| 14 | Luckwam distrct 14 | west | low |
| 15 | Luckwam distrct 15 | south | low |
| 16 | Luckwam distrct 16 | central | low |
| 17 | Luckwam distrct 17 | west | low |
| 18 | Luckwam distrct 18 | central | low |
| 19 | Luckwam distrct 19 | west | low |
| 20 | Luckwam distrct 20 | west | low |
| 21 | Luckwam distrct 21 | central | low |

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

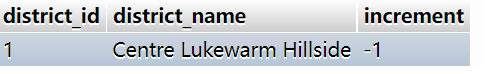
|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding citizen sims information has been added to citizen\_sims table and viral tests information has also been added to viral\_tests table. And sims\_conn\_bs, districts table also contains enough information.

The result of the SELECT statement (screenshots):



### Use case 8

Use case 8: Assume that the spread rate of a virus is calculated by dividing the total number of people that were in the same district as the positive case with 48 hours (calculated in use case 1) by the total number of people among them that later confirmed to be infected in 14 days. Again, assume that a person called Mark (telephone number is 233636) was tested to be positive at 19:30 on 09-Oct-2021 and he is the only person in the country that has coughid-19. Please write a query that calculates the spread rate of the virus.

Your SQL statement:

select t2.positive\_14\_numbers/t1.total\_48\_numbers as infection\_rate

from

(

select count(scb1.sim\_id) as total\_48\_numbers

from

(

select scb.station\_id, vt.report\_time as from\_time, date\_add(vt.report\_time, interval 48 hour) as to\_time

from citizen\_sims cs

join sim\_conn\_bs scb on scb.sim\_id=cs.sim\_id

join viral\_tests vt on vt.sim\_id=cs.sim\_id

where vt.report\_time='2021-10-09 19:30:00' and cs.phone\_number='233636'

and vt.sample\_result='positive'

) t

join sim\_conn\_bs scb1 on scb1.station\_id=t.station\_id

where scb1.conn\_time between t.from\_time and t.to\_time

) t1,

(

select count(distinct scb1.sim\_id) as positive\_14\_numbers

from

(

select scb.station\_id, cs.sim\_id, vt.report\_time as from\_time, date\_add(vt.report\_time, interval 14 day) as to\_time

from citizen\_sims cs

join sim\_conn\_bs scb on scb.sim\_id=cs.sim\_id

join viral\_tests vt on vt.sim\_id=cs.sim\_id

where vt.report\_time='2021-10-09 19:30:00' and cs.phone\_number='233636'

and vt.sample\_result='positive'

) t

join sim\_conn\_bs scb1 on scb1.station\_id=t.station\_id

join viral\_tests vt1 on vt1.sim\_id=scb1.sim\_id and vt1.sim\_id!=t.sim\_id

where vt1.report\_time between t.from\_time and t.to\_time

and vt1.sample\_result='positive'

) t2;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding citizen sims information has been added to citizen\_sims table and viral tests information has also been added to viral\_tests table. And sims\_conn\_bs table also contains enough information.

The result of the SELECT statement (screenshots):



## Extended Use Cases

Apart from the use cases proposed in the previous section, your database could also support more scenarios. Please follow the same format in the previous section and write down your own 10 use cases. You are allowed to use keywords learned outside of the lectures. Practical use cases displaying good innovations will receive higher marks.

### Use case 1:

Write a query get the all doctors name and the times they have make the viral\_tests contains all doctors.

Your SQL statement:

select d.doctor\_id, d.doctor\_name, count(vt.test\_id)

from doctors d left join viral\_tests vt on d.doctor\_id=vt.doctor

group by d.doctor\_id, d.doctor\_name;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following doctors information is added to the doctors table.

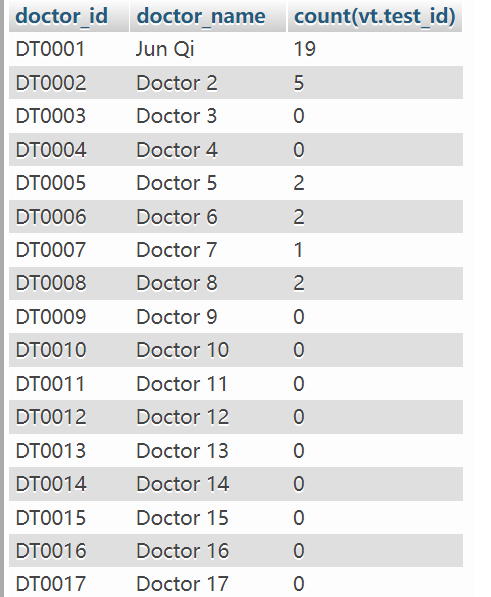
|  |  |  |  |
| --- | --- | --- | --- |
| doctor\_id | doctor\_name | age | hsptal\_id |
| DT0001 | Jun Qi | 34 | HSPT00001 |
| DT0002 | Doctor 2 | 45 | HSPT00001 |
| DT0003 | Doctor 3 | 23 | HSPT00001 |
| DT0004 | Doctor 4 | 45 | HSPT00002 |
| DT0005 | Doctor 5 | 45 | HSPT00002 |
| DT0006 | Doctor 6 | 46 | HSPT00002 |
| DT0007 | Doctor 7 | 57 | HSPT00003 |
| DT0008 | Doctor 8 | 54 | HSPT00003 |
| DT0009 | Doctor 9 | 55 | HSPT00004 |
| DT0010 | Doctor 10 | 56 | HSPT00004 |
| DT0011 | Doctor 11 | 57 | HSPT00005 |
| DT0012 | Doctor 12 | 36 | HSPT00006 |
| DT0013 | Doctor 13 | 37 | HSPT00007 |
| DT0014 | Doctor 14 | 38 | HSPT00008 |
| DT0015 | Doctor 15 | 39 | HSPT00009 |
| DT0016 | Doctor 16 | 40 | HSPT00010 |
| DT0017 | Doctor 17 | 25 | HSPT00011 |
| DT0018 | Doctor 18 | 56 | HSPT00012 |
| DT0019 | Doctor 19 | 28 | HSPT00012 |
| DT0020 | Doctor 20 | 34 | HSPT00012 |
| DT0021 | Doctor 21 | 36 | HSPT00012 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The above doctors information and viral tests information are all added to table doctors and viral\_tests. Join them together using doctor\_id and get the query result.

The result of the SELECT statement (screenshot):



### Use case 2:

Write a query to find the different age range and the number of citizens as for two viral test results.

Your SQL statement:

select vt.sample\_result,

case when cs.age<20 then 'youth'

when cs.age>=20 and cs.age<35 then 'young'

when cs.age>=35 and cs.age<60 then 'middle'

else 'old'

end as age\_range, count(distinct cs.sim\_id)

from viral\_tests vt join citizen\_sims cs on vt.sim\_id=cs.sim\_id

group by

vt.sample\_result,

case when cs.age<20 then 'youth'

when cs.age>=20 and cs.age<35 then 'young'

when cs.age>=35 and cs.age<60 then 'middle'

else 'old'

end;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

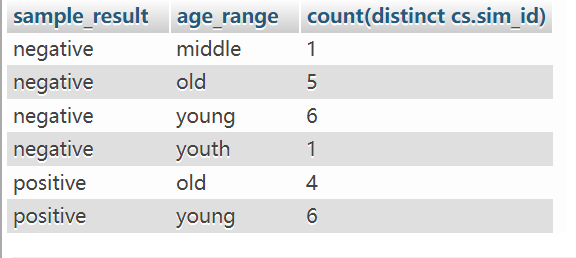
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The above citizen sims information and viral tests information are all added to table citizen\_sims and viral\_tests. Join them together using sim\_id and get the query result.

The result of the SELECT statement (screenshot):



### Use case 3:

Write a query to find all the hospitals which did not take any viral tests.

Your SQL statement:

select hsptal\_id,hsptal\_name

from hospitals

where hsptal\_id not in (select distinct hsptal\_id from viral\_tests);

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following hospitals information is added to the hospitals table.

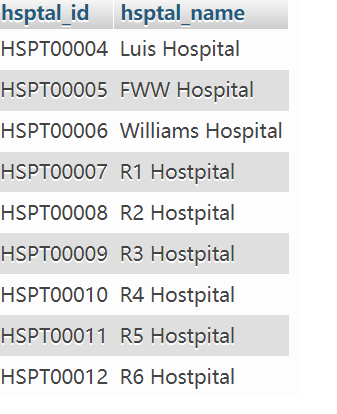
|  |  |  |
| --- | --- | --- |
| hsptal\_id | hsptal\_name | district\_id |
| HSPT00001 | Central Lukewarm Kingdom Hospital | 1 |
| HSPT00002 | North Lukewarm Kingdom Hospital | 2 |
| HSPT00003 | People of Lukewarm Kingdom Hospital | 1 |
| HSPT00004 | Luis Hospital | 2 |
| HSPT00005 | FWW Hospital | 3 |
| HSPT00006 | Williams Hospital | 4 |
| HSPT00007 | R1 Hostpital | 5 |
| HSPT00008 | R2 Hostpital | 6 |
| HSPT00009 | R3 Hostpital | 7 |
| HSPT00010 | R4 Hostpital | 8 |
| HSPT00011 | R5 Hostpital | 9 |
| HSPT00012 | R6 Hostpital | 10 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The corresponding hospitals information has been added to hospitals table and viral tests information has also been added to viral\_tests table.

The result of the SELECT statement (screenshot):



### Use case 4:

Write a query to find all the citizens who did not connect to any base stations in the The Lukewarm Kingdom.

Your SQL statement:

select citizen\_name, age, sex

from citizen\_sims

where sim\_id not in (select distinct sim\_id from sim\_conn\_bs);

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

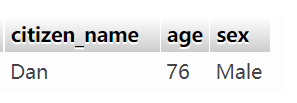
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

For all the information about citizens and viral tests are all added to tables. Use not in to find which citizen has not taken any viral tests.

The result of the SELECT statement (screenshot):



### Use case 5:

Write a query to find which district has the most positive cases in The Lukewarm Kingdom.

Your SQL statement:

select d.district\_name

from districts d join base\_stations bs on bs.district\_id=d.district\_id

join sim\_conn\_bs scb on scb.station\_id=bs.station\_id

join viral\_tests vt on vt.sim\_id=scb.sim\_id

where vt.sample\_result='positive'

group by d.district\_name

order by count(vt.test\_id) desc limit 1;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following districts information is added to the districts table.

|  |  |  |  |
| --- | --- | --- | --- |
| district\_id | district\_name | region | risk\_level |
| 1 | Centre Lukewarm Hillside | central | high |
| 2 | Lenny town | north | high |
| 3 | Glow Sand district | east | high |
| 4 | Raspberry town | central | mid |
| 5 | Bunny Tail district | north | low |
| 6 | Luckwam distrct 6 | central | low |
| 7 | Luckwam distrct 7 | east | low |
| 8 | Luckwam distrct 8 | south | low |
| 9 | Luckwam distrct 9 | north | low |
| 10 | Luckwam distrct 10 | west | low |
| 11 | Luckwam distrct 11 | central | low |
| 12 | Luckwam distrct 12 | south | low |
| 13 | Luckwam distrct 13 | north | low |
| 14 | Luckwam distrct 14 | west | low |
| 15 | Luckwam distrct 15 | south | low |
| 16 | Luckwam distrct 16 | central | low |
| 17 | Luckwam distrct 17 | west | low |
| 18 | Luckwam distrct 18 | central | low |
| 19 | Luckwam distrct 19 | west | low |
| 20 | Luckwam distrct 20 | west | low |
| 21 | Luckwam distrct 21 | central | low |

The following sims connection to base stations information is added to the sim\_conn\_bs table.

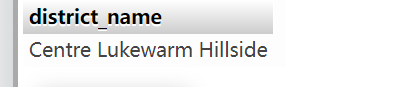
|  |  |  |  |
| --- | --- | --- | --- |
| sim\_id | station\_id | conn\_time | disconn\_time |
| 1001 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1002 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1003 | 201 | 2021/10/9 10:30 | 2021/11/3 21:00 |
| 1004 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1005 | 201 | 2021/12/3 14:00 | 2021/12/4 11:00 |
| 1006 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1006 | 201 | 2021/10/10 7:30 | 2021/11/4 11:00 |
| 1007 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/8 19:23 | 2021/10/8 22:23 |
| 1009 | 201 | 2021/10/10 9:30 | 2021/11/5 21:00 |
| 1010 | 201 | 2021/12/2 11:00 | 2021/12/3 21:00 |
| 1011 | 201 | 2021/12/4 11:00 | 2021/12/5 21:00 |
| 1012 | 201 | 2021/10/10 0:30 | 2021/11/9 11:00 |
| 1012 | 202 | 2021/12/3 10:00 | 2021/12/6 10:20 |
| 1013 | 202 | 2021/12/3 10:00 | 2021/12/7 10:20 |
| 1014 | 202 | 2021/12/3 10:00 | 2021/12/8 10:20 |
| 1015 | 201 | 2021/10/19 2:30 | 2021/11/9 11:00 |
| 1015 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1016 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1017 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1018 | 203 | 2021/12/4 11:00 | 2021/12/5 11:00 |
| 1019 | 201 | 2021/12/6 14:00 | 2021/12/9 11:00 |
| 1020 | 204 | 2021/12/5 13:00 | 2021/12/5 13:00 |
| 1021 | 204 | 2021/12/5 14:00 | 2021/12/5 15:00 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The above districts information and viral tests information are all added to tables Join districts, base\_stations and viral\_tests together to query the result.

The result of the SELECT statement (screenshot):



### Use case 6:

Write a query to find who has take the most times viral tests. List their name.

Your SQL statement:

select cs.citizen\_name

from citizen\_sims cs

join viral\_tests vt on cs.sim\_id=vt.sim\_id

group by cs.citizen\_name

order by count(vt.test\_id) desc limit 1;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

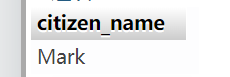
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

For all the information about citizens and viral tests are all added to tables. Use group by and order by to find which citizen has taken the most times tests.

The result of the SELECT statement (screenshot):



### Use case 7:

Write a query to find who has test two more times and the same doctor test for him/her.

Your SQL statement:

select \*

from

(

select

t1.sim\_id, t1.doctor, t1.report\_time,

(

select t2.report\_time

from viral\_tests t2

where t1.sim\_id=t2.sim\_id and t1.doctor=t2.doctor and t1.test\_id!=t2.test\_id and t1.report\_time<t2.report\_time

) as again\_report\_time

from viral\_tests t1

) t where again\_report\_time is not null;

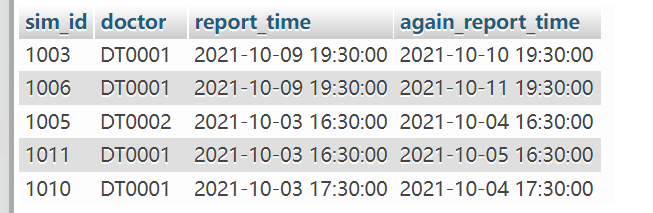
Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

The all information about viral tests has been added to table viral test.

The result of the SELECT statement (screenshot):



### Use case 8:

Write a query to find the citizen’s name who has take more than 2 negative sample tests and they ever take the sample test get positive result.

Your SQL statement:

select cs.citizen\_name

from citizen\_sims cs join viral\_tests vt on vt.sim\_id=cs.sim\_id

where vt.sample\_result='negative' and cs.sim\_id in (select distinct sim\_id from viral\_tests where sample\_result='positive')

group by cs.citizen\_name

having count(vt.test\_id)>=2;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

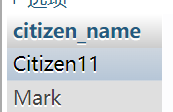
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

For all the information about citizens and viral tests are all added to tables.

The result of the SELECT statement (screenshot):



### Use case 9:

Write a query to find citizen’s sim id and month they have taken the tests, and output the test times.

Your SQL statement:

select cs.sim\_id,month(vt.report\_time) as test\_month, count(vt.test\_id) as test\_times

from viral\_tests vt join citizen\_sims cs on cs.sim\_id=vt.sim\_id

join sim\_conn\_bs scb on scb.sim\_id=cs.sim\_id

where year(vt.report\_time)=2021

group by cs.sim\_id, month(vt.report\_time)

having count(vt.test\_id)>=2;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

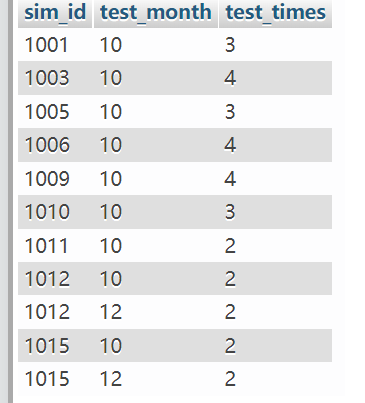
The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

For all the information about citizens and viral tests are all added to tables.

The citizen\_sims table contains all citizens who pass by the The Lukewarm Kingdom, use the citizen\_sims table join viral\_tests table then join sim\_conn\_bs table can get the result of who take the test, use where to filter year=2021 and use having statement filter who has taken more than 2 times.

The result of the SELECT statement (screenshot):



### Use case 10:

Write a query to count the citizens number of two different sample result on different sex.

Your SQL statement:

select cs.sex, vt.sample\_result, count(distinct cs.sim\_id)  
from viral\_tests vt join citizen\_sims cs on vt.sim\_id=cs.sim\_id  
group by cs.sex, vt.sample\_result;

Your test data and why it can prove that the SELECT statement works (Important! Please explain carefully):

The following citizen sims information is added to the citizen\_sims table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sim\_id | citizen\_name | phone\_number | sex | age |
| 1001 | Mark | 233636 | Male | 25 |
| 1002 | William | 3213123 | Male | 26 |
| 1003 | John | 3423423 | Male | 27 |
| 1004 | Colin | 3212123 | Male | 28 |
| 1005 | July | 232324 | Female | 29 |
| 1006 | Maple | 232323432 | Female | 34 |
| 1007 | Tuple | 3233231 | Male | 67 |
| 1008 | Dan | 12343545 | Male | 76 |
| 1009 | Chen Jiajun | 233435321 | Male | 70 |
| 1010 | Citizen10 | 313435 | Male | 67 |
| 1011 | Citizen11 | 2122321 | Female | 89 |
| 1012 | Citizen12 | 2122322 | Female | 22 |
| 1013 | Citizen13 | 42322323 | Female | 23 |
| 1014 | Citizen14 | 2122324 | Male | 12 |
| 1015 | Citizen15 | 21432325 | Male | 67 |
| 1016 | Citizen16 | 2122326 | Female | 78 |
| 1017 | Citizen17 | 21322327 | Male | 35 |
| 1018 | Citizen18 | 2122328 | Female | 36 |
| 1019 | Citizen19 | 2662329 | Male | 89 |
| 1020 | Citizen20 | 78892330 | Female | 28 |
| 1021 | Citizen21 | 2122331 | Male | 56 |

The following viral tests information is added to the viral\_tests table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| test\_id | sample\_type | sim\_id | sample\_resut | sample\_collect\_time | sample\_test\_time | report\_time | doctor | hsptal\_id |
| 1 | Coughid-21 | 1001 | negative | 2021/10/3 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 2 | Coughid-21 | 1001 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 3 | Coughid-21 | 1005 | positive | 2021/10/4 10:30 | 2021/10/4 14:30 | 2021/10/4 16:30 | DT0002 | HSPT00001 |
| 4 | Coughid-21 | 1011 | positive | 2021/10/5 10:30 | 2021/10/5 14:30 | 2021/10/5 16:30 | DT0001 | HSPT00001 |
| 5 | Coughid-21 | 1010 | positive | 2021/10/4 10:30 | 2021/10/4 13:30 | 2021/10/4 17:30 | DT0001 | HSPT00001 |
| 6 | Coughid-21 | 1019 | negative | 2021/10/7 10:30 | 2021/10/7 14:30 | 2021/10/7 18:30 | DT0002 | HSPT00001 |
| 7 | Coughid-21 | 1003 | positive | 2021/10/9 20:30 | 2021/10/10 14:30 | 2021/10/10 19:30 | DT0001 | HSPT00001 |
| 8 | Coughid-21 | 1006 | negative | 2021/10/10 10:30 | 2021/10/11 14:30 | 2021/10/11 19:30 | DT0001 | HSPT00001 |
| 9 | Coughid-21 | 1009 | positive | 2021/10/10 10:30 | 2021/10/19 14:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 10 | Coughid-21 | 1012 | negative | 2021/10/10 10:30 | 2021/10/12 14:30 | 2021/10/12 19:30 | DT0001 | HSPT00001 |
| 11 | Coughid-21 | 1015 | negative | 2021/10/19 20:30 | 2021/10/19 22:30 | 2021/10/19 19:30 | DT0001 | HSPT00001 |
| 12 | Coughid-21 | 1001 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 13 | Coughid-21 | 1002 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 14 | Coughid-21 | 1003 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 15 | Coughid-21 | 1004 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 16 | Coughid-21 | 1005 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 17 | Coughid-21 | 1006 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 18 | Coughid-21 | 1007 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0001 | HSPT00001 |
| 19 | Coughid-21 | 1009 | negative | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0002 | HSPT00001 |
| 20 | Coughid-21 | 1010 | positive | 2021/10/9 10:30 | 2021/10/9 14:30 | 2021/10/9 19:30 | DT0005 | HSPT00002 |
| 21 | Coughid-21 | 1011 | negative | 2021/11/19 20:30 | 2021/11/19 22:30 | 2021/11/19 19:30 | DT0005 | HSPT00002 |
| 22 | Coughid-21 | 1012 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 23 | Coughid-21 | 1020 | negative | 2021/12/1 10:30 | 2021/12/1 14:30 | 2021/12/1 19:30 | DT0006 | HSPT00002 |
| 24 | Coughid-21 | 1013 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 25 | Coughid-21 | 1014 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0001 | HSPT00001 |
| 26 | Coughid-21 | 1015 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0007 | HSPT00003 |
| 27 | Coughid-21 | 1019 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 28 | Coughid-21 | 1018 | negative | 2021/12/2 10:30 | 2021/12/2 14:30 | 2021/12/2 19:30 | DT0008 | HSPT00003 |
| 29 | Coughid-21 | 1005 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0002 | HSPT00001 |
| 30 | Coughid-21 | 1011 | negative | 2021/10/3 10:30 | 2021/10/3 14:30 | 2021/10/3 16:30 | DT0001 | HSPT00001 |
| 31 | Coughid-21 | 1010 | negative | 2021/10/3 10:30 | 2021/10/3 13:30 | 2021/10/3 17:30 | DT0001 | HSPT00001 |

For all the information about citizens and viral tests are all added to tables.

The citizen\_sims table contains all citizens who pass by the The Lukewarm Kingdom, they are females and males, use this table join viral\_tests table can get the result of number of gender infected.

The result of the SELECT statement (screenshot):

