WESH sampler system

Purpose

The purpose of this mandatory exercise is to go through all the steps of modeling a database.

Description

The research group Water Sanitation Environment and Health (WESH) wants a system to modernize their data analysis and gathering for their pilot plant.

The they have a pilot plant that is operated by operator personnel where spot samples will be taken. It is the groups desire that there is a button that the operator presses at the time of sample taking. This will print out a label with a QR code or bar code that can be placed on the sample jar.

When the QR/bar code is created it should register the time when the sample is taken, and which operator took the sample in a database for that QR/bar code. The operator should be able to select a sample type, which must describe a series of tests that should be performed on this sample.

The samples are then to be sent to a lab operated by research personnel. When they receive a sample, it will be scanned and the details of the sample; what tests to perform and how to perform those tests should appear. The tests that are to be performed should come from what the sample type is (test grouping)

Once these tests have been done, the researcher should be able to register the results of those tests to the database.

WESH already have an idea of **some** of the tables they think they need:

samples(QR_code, operator_id, sample_type, sample_time)

operators(operator_id, name, role)

analysis_results(analysis_id ,QR_code, analysis_time, analysis_result, operator_id)

available_tests(test_id, test_description)

test_groups(test_group, group_name,test_id)

The WESH group is however not too familiar with database design so it is up to you to create a finished model that satisfies their requirements. One important feature that is missing is, how does the researcher get which tests do perform on the samples in lab?

Assignment

It is your job to complete the model of their database. You will have to make a model in Mysql Workbench which fulfill the following requirements.

- The database must be completely normalized (3. normal form)
- All tables must be connected with the correct relationships/cardinality (foreign/primary keys)

The following requirements for the information stored in the database must also be fulfilled

- A sample must belong to a sample type
- A sample type (or sample group) decides which tests should be done on the sample

- The lab technician needs to get a list of all tests to be done when he scans a sample. This list should describe how the tests are to be performed.
- Managers should be able to edit the test descriptions, test groupings so they can add new tests when needed.

Necessary queries

- A query that returns the following (Analysis to be performed for a specific QR coded sample, 1 in this case)

QR_code	sample_time	test_group_name	test_name	test_description
1	2020-03-10 14:00:00	Full tests	Ortophosphate	"Zero" the meter (if you are using on...
1	2020-03-10 14:00:00	Full tests	Total suspended solids	TSS of a water or wastewater sample...
1	2020-03-10 14:00:00	Full tests	nitrogen	1. Start program
1	2020-03-10 14:00:00	Full tests	PH	The pH value can be measured using...

- A query as above, but it excludes those tests that have already been done for that sample
- A query that inserts a new row into samples at the current time
- A query that gets all tests performed by a specific operator

You have to decide the necessary attributes, tables, relations and primary/foreign keys that you think will fulfil these requirements.

Database data

WESH have already started using their pilot plant. They have supplied their data in csv files.

Samples_taken.csv

- Contains all samples taken, when and by whom plus their sample type

Analysis_done.csv

- All the analysis done on the sample

Test_groups.csv

- Test descriptions and what group they belong to

They have 3 employees working

Aleksander - operator

Nils – operator

Frank - lab technician

Delivery

You should deliver 3 files.

1. A workbench file (.mwb) containing the model
2. An SQL script containing all the necessary SQL codes to generate the database with INSERTS of required data.
3. A report (pdf) which contains the following:

- A description and evaluation of the modelling process where you explain the choices you make
- Assessment of each table and their relations
    - How do they fulfil the requirements set?
    - Potential problems and considerations when expanding the model in the future
        - What if operators need to register if they are qualified to work in the lab/plant?
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- An image of the final model
- The necessary queries.

Hints

Workbench
Create a new model with file>new model (ctrl + N)

Save the model so you don't lose progress if something crashes with file>save model (ctrl+s). The model is saved in a .mwb file which can be opened by workbench (remember where you save it).

Note that the default name of the database (schema) when you create a model in workbench is Mydb. This should be changed to "Yeyland_Wutani" otherwise the name of your database will be Mydb.

To create a new diagram to model on double click the "add diagram" button. This will open a new tab where you can place tables, edit tables and manage the relationships.

Once you are done with the model you can export it as a image file with file>export>export as PNG

To get the .sql script use file>export>Forward engineer SQL create script. Select where you wish to save the sql file on the top. If you want to run the file multiple times, check the box next to "generate DROP statements before each create statement".

Testing
Fill inn some data in your database and write some sql queries to check that your database fulfills the requirements set in the assignment once you have a model