CSI 3335 Fall 2018

Programming Homework

Due: 11/5 (Mon) 11:59pm. You get a 5% bonus if you hand in before 11:59pm on 10/30 (Wed).

You are to develop a small application that store results of experiments.

Data

Many research studies require experiments where experiments are run and results are collected. You are to implement a database application that can keep track of all those information.

Table definition

You are to set up the following tables (keys are in boldface)

- Experiment

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment
ManagerID	CHAR(6)	ID of the Manager of the experiment
StartDate	DATE	The date where the experiment starts
DataEntryDate	DATE	The date where information about the experiment is entered into the database

- ParametersTypes

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment (Foreign key: ExperimentID in Experiment)
ParameterName	VARCHAR	Name of the parameter of the experiment
Type	VARCHAR	Type of that parameter (must be one of the following: INT, FLOAT, STRING, URL, DATE, DATETIME)
Required	BOOLEAN	Whether the parameter is required for every run of the experiment

- ResultTypes

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment (Foreign key: ExperimentID in Experiment)
ResultName	VARCHAR	Name of the parameter of the experiment
Type	VARCHAR	Type of that parameter (must be one of the following: INT, FLOAT, STRING, URL, TIME)
Required	BOOLEAN	Whether the parameter is required for every run of the experiment

- Runs

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment

		(Foreign key: ExperimentID in Experiment)
TimeOfRun	DATETIME	Date/time that experiment is run
ExperimenterSSN	CHAR(6)	ID of person who run the experiment (no need to be the manager)
Success	BOOLEAN	Whether the current run is successful

- RunsParameter

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment
TimeOfRun	DATETIME	Date/time that experiment is run
ParameterName	VARCHAR	Parameter of that experiment
Value	VARCHAR	Value of the parameter for that run (notice that no matter whatever type it is, we store it as a string)

Foreign key constraint: (ExperimentID, TimeOfRun) -> Runs
Foreign key constraint: (ExperiementID, ParameterName) -> ParameterTypes

Parameters must always be entered even if the experiment run is unsuccessful.

- RunsResult

Attribute	Type	Info
ExperimentID	VARCHAR	Unique identifier for each experiment (Foreign key: ExperimentID in Experiment)
TimeOfRun	DATETIME	Date/time that experiment is run
ResultName	VARCHAR	Name of the result
Value	VARCHAR	Value of the result for that run (notice that no matter whatever type it is, we store it as a string)

Foreign key constraint: (ExperimentID, TimeOfRun) -> Runs
Foreign key constraint: (ExperiementID, ResultName) -> ResultTypes

Task

You task is to write a C++ program that allow users to enter data and retrieve results. You should write it as a console application (i.e. you do not need to create a GUI). However you are required to maintain consistency of the data.

Your program should provide option to the user for the following tasks:

- Experiment Entry: Enter the information about an experiment (not a particular run).
- Run Entry: Enter the information about a particular run (include parameter and results).

It is crucial that your data entry process ensure the integrity of the database. However, if you program expect a integer to be input and it input a string, you can choose to end the program on the spot. (use try..catch block to potentially make your program easier to write)

- Display information of an experiment (metadata only): information about the experiment, but not individual run results [user supply experimentID]
- Display information of a run (parameter and result values only) [user supply experimentID]
- Generate experiment report: generate a HTML that contains results of all the runs of an experiment [user provide experiment ID]. You should use HTML tables to format the output
- Generate aggregate report: ask the user about an experimentID and results that can be aggregated (sum and average) and also a date range. Output the aggregate value of the result parameter specified.
- [Extra credit]
    - Parameter search: ask user for a parameter name and type, output all experiments that have that parameter and order them in terms of start date
    - Compare experiments: ask user for an experiment ID. Output all experiments that have the same set of parameter (name and type) as well as results (name and type). Output only metadata info about the experiments.

What to hand in

You need to hand in the following

- Your source code in C++. Your program should assume the tables are stored in a schema named "Experiment", and the username and password for the mysql database should be "HW3335" and "PW3335" respectively.

- A 1-2 page summary. It should include
    - Any change you make to the database schema and rationale of your changes
    - Description of your program files (especially a description of different classes, if you have them)