CSE 111 – DATABASE SYSTEMS
Lab 8

In this lab session, you will learn how to create indexes for a query workload by using the recommendations of a database auto-tuner. Specifically, you have to create indexes for the queries in Lab 3 based on the recommendations provided by the `SQLite Expert`. To achieve this, you have to use the `.expert` command from `SQLite`. When applied to a query, `.expert` provides index suggestions to make the query run optimally. `.expert` does not create the suggested indexes. This is the responsibility of the user.
In order to complete the lab you have to perform the following tasks:

1. Log in to your GitLab account.
2. Explore the folders and files in the Lab 8 repo.
3. Create a merge request for the `Instructions` issue. This is done from the `Issues` tab. The result of the merge request is a new branch that copies the files from `master`.
4. Clone the repo to your local machine or the remote lab machine. You can choose to directly clone the branch for the merge request, or the `master` and then checkout the merge request branch.
5. Execute the queries from Lab 3, whose `SQL` statements are provided in the files `test/x.sql`, where `x` is the number of the query. In addition to the `SQL` statement, these files activate the query analyzer `.eqp`, which displays the query execution plan. Since there are no indexes in the database, all the queries require table scan and/or automatic index creation.
6. For every query going from 1 to 15, invoke the `.expert` command to get the optimal index recommendation. Then, create the suggested indexes with the name pattern `table_idx_attribute1_attribute2`, e.g., `lineitem_idx_l_quantity`. Once you are done with all the indexes for a query, go to the following query.
7. Execute the queries from Lab 3 again. This time, the query execution plans have to include the created indexes.
8. The correctness of your submission is checked by executing the `SQL` statements in the `create-index.sql` file. This is the only file you are required to edit. The file has to include all the index creation statements recommended by the auto-tuner.
9. You can check the correctness of your index creation by executing the command `make run` in the terminal. You have to be in the main lab folder. The expected output is available in `results/x.res`, where `x` is the number of the query. The output produced by your code is available in `output/x.out`. They have to match exactly for every query, e.g., `1.res` has to match with `1.out`. Notice that the match has to be in the query execution plan since you do not write the `SQL` statement. The expected plan uses indexes, which have to have exactly the same name as in the `res` file. There may be formatting differences between the query plan printed on your local machine and the expected plan. The final check is done in `GitLab`, so follow that format.
10. Commit the changes to the `create-index.sql` file and then push to the `GitLab` server.
11. Check the output of the pipeline under the `CI / CD` tab to see if your push has passed all the tests.

The score for the lab is assigned based on passing the test cases and the commit/push history. The instructor and the TAs have access to the `GitLab` repos.