CSE 111 – DATABASE SYSTEMS
Lab 8

In this Lab session you will learn how to work with indexes. You will investigate the effect indexes have on query execution time and on data modification operations. You have to do the following:

1. Create new tables in your TPCH database:
   - `customer_index`, `customer_noindex` with exactly the same schema as `customer`
   - `supplier_index`, `supplier_noindex` with exactly the same schema as `supplier`
   - `lineitem_index`, `lineitem_noindex` with exactly the same schema as `lineitem`
   - `orders_index`, `orders_noindex` with exactly the same schema as `orders`
2. Create the following indexes:
   - `customer_name_index` on `c_name` attribute from `customer_index` table
   - `supplier_acctbal_index` on `s_acctbal` attribute from `supplier_index` table
   - `orders_orderdate_index` on `o_orderdate` attribute from `orders_index` table
   - `lineitem_discount_index` on `l_discount` attribute from `lineitem_index` table
3. Copy all the data from `customer` to `customer_index` and `customer_noindex` using a single `INSERT` statement. Measure the time each `INSERT` statement takes. Compare them. Do the same for the other 3 tables: `supplier` to `supplier_index` and `supplier_noindex`; `lineitem` to `lineitem_index` and `lineitem_noindex`; `orders` to `orders_index` and `orders_noindex`. Report the 8 execution times for the 8 `INSERT` statements. **(8 execution times)**
4. Create the following indexes:
   - `customer_mktsegment_index` on `c_mktsegment` attribute from `customer_index` table
   - `lineitem_returnflag_index` on `l_returnflag` attribute from `lineitem_index` table
   - `orders_priority_index` on `o_orderpriority` attribute from `orders_index` table

   Measure the time it takes to create the indexes and report them. **(3 execution times)**
5. Execute the 15 queries from Lab 3 on the `***_index` tables and measure the execution time for each query. In other words, replace each table for which there is an equivalent `index` table with the `index` table. Execute the 15 queries from Lab 3 on the `***_noindex` tables and measure the execution time for each query. In other words, replace each table for which there is an equivalent `noindex` table with the `noindex` table. Report the query execution time for every query. **(30 execution times)**
6. Write an `UPDATE` statement that increases the discount by `0.05` for every line item. Execute this statement on `lineitem_index` and `lineitem_noindex`, respectively. Measure and report the execution times. **(2 execution times)**
7. Write an `UPDATE` statement that increases the account balance by `1000` for every supplier. Execute this statement on `supplier_index` and `supplier_noindex`, respectively. Measure and report the execution times. **(2 execution times)**

You are required to submit a file containing the execution times you obtain for the 45 statements and discuss the differences you observe for the corresponding pair statements. **(1 pt for every 3 execution times for a total of 15 points)**