CSCI235 – Database Systems
2025 S2
Implementation Task 2

Due date: 11 May 2025

Scope

The Implementation of Task 1 is related to the contents of the topic on Indexing and PL/SQL.

This Implementation is due by **Sunday, 11 May 2025, 9:00 pm Singapore time**. This task is worth 3% of the total assessment for the subject.

Only electronic submission through Moodle at:
https://moodle.uowplatform.edu.au/

is accepted. All email submission will be deleted and mark 0 ("zero") will be awarded.

For Task 1, your report or output must include the listing of the execution of your SQL scripts that includes the explain analyze statements, the creation of the indexes and the output of the show plan statements.

SQL Script Requirements:

- Include the following settings at the **beginning of your script**:
  - `\set ECHO all` – This will ensure that all SQL commands are echoed to the terminal.
  - `\set ECHO none` – Use this to stop echoing the commands when needed.

The submission procedure is explained at the end of this specification.

Specification

Step 1
If you have not done it yet, download the TPCHR sample database and load the sample TPCHR using user account CSCI235. This will make the user account CSCI235 the owner of the TPCHR database.

Step 2
In this step we shall use the relational tables included in a sample TPCHR benchmark database owned by the user CSC235. The conceptual schema of the sample database is included in the file tpchr.pdf.

The objective of this task is to find the **smallest** number of indexes that improve performance of a given collection of SELECT statements. We do not expect the best possible improvement in performance for each SELECT statement, however, processing of each SELECT statement must benefit from the existence of at least one of the indexes. An important objective is to minimize the total number of indexes created.

Task 1 (5.0 marks)
Indexing

Indexing
Using the relational table LINEITEM of the sample database TPCHR, for each one of the queries listed below:

i. Find all the discount (l_discount) of all the items that are shipped (l_shipdate) most recently. Hint. Most recently mean the latest shipment date.

ii. Find the total number of items shipped by air (l_shipmode) in 1998 (l_shipdate).

iii. Find the order number (l_orderkey) and item number (l_linenumber) that have the highest discount (l_discount).

iv. Find the total number of item per line status (l_linestatus). List the line status and the total items per line status.

v. Find the order key (l_orderkey), line item number (l_linenumber), line status (l_linestatus), shipment date (l_shipdate) and shipment mode (l_shipmode) of all orders with the order number (l_orderkey) 1795718, 1799046, and 1794626.

a) Construct an SQL statement that produces the required output specified in the statement. **(1.5 marks)**

b) Find the **smallest** number of indexes that improve performance of a given collection of SELECT statements of a relational table LINEITEM. The smallest number of indexing means a database system will compute the five queries constructed in (a) using one or more indexes that you have created. Hint, you may create an index that can be used to compute more than one queries. Use the explain analyze and show plan statements to justify your solutions. **(1.5 marks)**

Deliverables

A file solution1.pdf with CREATE INDEX statements that improve the performance of the queries listed (i, ii, iii, iv, and v above) and the execution plan generated.

Please remember that you must consider each one of the queries as an individual case! Please remember that all relational tables are large enough to make full table scans more time consuming that accessing the tables through an index! It means that any solution in which an index is not used for query processing is incorrect.

Submissions

This assignment is due by 9:00 pm (21:00 hours) Sunday,11 May 2025 **Singapore time**.

Submit the files solution1.txt **(or solution1.pdf)** through Moodle in the following way:

1) Access Moodle at **http://moodle.uowplatform.edu.au/**
2) To login use a Login link located in the right upper corner the Web page or in the middle of the bottom of the Web page
3) When successfully logged in, select a site CSCI235 (SP225) Database Systems
4) Scroll down to a section Submissions of Implementation Tasks
5) Click at Submit your Implementation Task 2 here link.
6) Click at a button Add Submission
7) Move the solution1.txt **(or solultion1.pdf)** into an area provided in Moodle. You can drag and drop files here to add them. You can also use a link *Add…*
8) Click at a button Save changes,
9) Click at check box to confirm authorship of a submission,
10) When you are satisfied, remember to click at a button Submit assignment.

A policy regarding late submissions is included in the subject outline.

Only one submission per student is accepted.

Implementation Task 2 is an individual assessed task and it is expected that all its tasks will be solved individually without any cooperation with the other students. Plagiarism is treated seriously. Students involved will likely receive zero. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or over e-mail.

End of specification