School of Information Technology & Computer Science
University of Wollongong

Session: **3, July 2023**
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CSCI317 Database Performance Tuning
Singapore 2023-3
Assignment 4

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Scope

This assignment includes the tasks related to the performance related improvements of JDBC database applications.

This assignment is due by **Saturday, 2 September, 2022, 9.00 pm (sharp) Singaporean Time.**

This assignment contributes to 15% of the total evaluation in the subject.

A submission procedure is explained at the end of specification.

This assignment consists of 2 tasks and specification of each task starts from a new page.

It is recommended to solve the problems before attending a laboratory class in order to efficiently use supervised laboratory time.

A submission marked by Moodle as "late" is treated as a late submission no matter how many seconds it is late.

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

A submission of compressed files (zipped, gzipped, rared, tared, 7-zipped, lhzed, … etc) is not allowed. The compressed files will not be evaluated.

All files left on Moodle in a state "`Draft(not submitted)`" will not be evaluated.

It is expected that all tasks included within **Assignment 4** will be solved **individually without any cooperation** with the other students. If you have any doubts, questions, etc. please consult your lecturer or tutor during lab classes or office hours. Plagiarism will result in a **FAIL** grade being recorded for the assessment task.

Please read very carefully information included in Prologue section below about software environment to be used in the subject.

Prologue

In this subject we use Oracle 19c database server running under Oracle Linux 7.4 operating system on a virtual machine hosted by VirtualBox. To start Oracle database server you have to start VirtualBox first. If you have not installed VirtualBox on your system yet then it is explained in Cookbook for CSIT115 Recipe 1.1, Step 1 "How to use VirtualBox ?" (`https://www.uow.edu.au/~jrg/115/cookbook/e1-1-frame.html`) how to install and how to start VirtualBox.

When VirtualBox is started, import an appliance included in a file `OracleLinux7.4-64bits-Oracle19c-22-JAN-2020.ova`. You can download `ova` image of the appliance using the links published on Moodle.

When ready, power on a virtual machine `OracleLinux7.4-64bits-Oracle19c-22-JAN-2020`.

A password to a Linux user `ORACLE` is `oracle` and a password to Oracle users `SYSTEM` and `SYS` (database administrators) is also `oracle`. Generally, whenever you are asked about a password then it is always `oracle`, unless you change it.

When logged as a Linux user, you can access Oracle database server either through a command line interface (CLI) `SQLcl` or through Graphical User Interface (GUI) `SQL Developer`.

You can find in Cookbook for CSCI317, Recipe 1, How to access Oracle 19c database server, how to use SQL Developer, how to use basic SQL and SQLcl, and how to create a sample database ?
(`https://documents.uow.edu.au/~jrg/317sim/cookbook/e1-2-frame.html`) more information on how to use `SQLcl` and `SQL Developer`.

Tasks

Task 1 (10 marks)

An objective of this task is to improve performance of JDBC application.

In this task you must operate on the original state of a sample benchmark `TPC-HR` database. It is explained at the end of **Prologue** section how to return to the original state of the database.

Consider implementation of JDBC application in a file `task1.java`.

Your task is to improve performance of the application.

Implement JDBC application with the same functionality as an application included in a file `task1.java` and save it in a file `solution1.java`.

Use Linux command `time` to measure time spend on processing of the application before and after the improvements in the following way.

```
time java task1
time java solution1`
```

Explain in the comments attached at the end of a file `solution1.java` why the original application was slower than the improved one and include the results from testing with `time` command.

Deliverables

A file `solution1.java` with the improved application, with the explanations why the original application was slower than the improved one and with the results from testing with `time` command.

Task 2 (5 marks)
An objective of this task is to improve performance of JDBC application.

In this task you must operate on the original state of a sample benchmark `TPC-HR` database. It is explained at the end of **Prologue** section how to return to the original state of the database.

Consider implementation of JDBC application in a file `task2.java`.

Your task is to improve performance of the application.

Implement JDBC application with the same functionality as an application included in a file `task2.java` and save it in a file `solution2.java`.

Use Linux command `time` to measure time spend on processing of the application before and after the improvements in the following way.

```
time java task2
time java solution2
```

Explain in the comments attached at the end of a file `solution2.java` why the original application was slower than the improved one and include the results from testing with `time` command.

Deliverables
A file `solution2.java` with the improved application, with the explanations why the original application was slower than the improved one and with the results from testing with `time` command.

Submission

Note, that you have only one submission. So, make it absolutely sure that you submit the correct files with the correct contents. No other submission is possible!

Submit the files **`solution1.java`** and **`solution2.java`** 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 logged select a site **`CSCI317 (SP323) Database Performance Tuning`**
(4) Scroll down to a section **`Submissions`**
(5) Click at a link **`In this place you can submit the outcomes of Assignment 4`**
(6) Click at a button **`Add Submission`**
(7) Move a file **`solution1.java`** into an area **`You can drag and drop files here to add them`**. You can also use a link **`Add`**...
(8) Repeat step (7) for a file **`solution2.java`**.
(9) Click at a button **`Submit assignment`** for the bottom of the current web page.
(10) Click at the checkbox with a text attached: **`By checking this box, I confirm that this submission is my own work,`** ... in order to confirm the authorship of your submission.
(11) Click at a button **`Continue`**
(12) Check if **`Submission status`** is **`Submitted for grading`**.

End of specification