Assignment 6

Concurrency Tuning

Database Tuning

Start date: Dec 15, 2016
Due date: Jan 10, 2017, 23:59
Grading: 5 points

In this assignment you will explore the concurrency control features of PostgreSQL.

A company with 100 employees pays the salaries at the end of the month. The account of the company (account number 0, initial balance 100) and the accounts of all employees (account numbers 1 to 100, initial balance 0) are with the same bank. The payment transactions should run concurrently. Here are two approaches to solve the problem:

(a) For each employee $1 \leq i \leq 100$ run the following transaction:
$e \leftarrow$`SELECT balance FROM Accounts WHERE account=i`
`UPDATE Accounts SET balance=`$e + 1$ `WHERE account=i`
$c \leftarrow$`SELECT balance FROM Accounts WHERE account=0`
`UPDATE Accounts SET balance=`$c - 1$ `WHERE account=0`

(b) For each employee $1 \leq i \leq 100$ run the following transaction:
`UPDATE Accounts SET balance=balance+1 WHERE account=i`
`UPDATE Accounts SET balance=balance-1 WHERE account=0`

Task 1: Run solution (a) with isolation level `READ COMMITTED`. Compare throughput and correctness for different numbers of concurrent transactions, ranging from 1 to 5. The correctness is defined as $(c_1 - c_2)/100$, where c_1 and c_2 are the balances of account 0 before and after running all transactions, respectively. Repeat the experiment with isolation level `SERIALIZABLE`.

Notes: If a query is rolled back, restart it until it commits. A java template code is provided in `account.zip`.

Task 2: As Task 1, but for solution (b).

Task 3: Discuss the outcome and explain the difference between the isolation levels in PostgreSQL with respect to your experiment. The following information sources might be useful:

- Lecture notes:
`http://dbresearch.uni-salzburg.at/teaching/2016ws/dbt/dbt_04-handout-1x1.pdf`

- PostgreSQL documentation:
  `http://www.postgresql.org/docs/9.2/static/transaction-iso.html`

Please indicate the average time per group member that was spent solving this assignment. The time that you indicate will have *no* impact on your grade.

Grading scheme:

Category	**max. Points**
Description of your setup	0.5
Execution of experiments (Task 1 and 2)	1.5
Discussion of results (Task 3)	1.5
Isolation level discussion (Task 3)	1.5