Exercises for *Transaction Systems*, summer term 2016

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http://www-db.in.tum.de/teaching/ss16/transactions/

Sheet No. 11 (No. 10 is missing because there was no regular lecture in week 10.)

Info

- Due date: Friday, July 8, 3pm.
- Please send your solution via e-mail, and prefix the subject with `[transactions]`.
- Please include your Matrikelnummer and your name.
- Please submit a PDF.

Exercise 1 (6 points) Show for the IDM model of transactions:
  (a) Final state serializability is not monotone.
  (b) Conflict serializability is monotone.

Exercise 2 (4 points) Discuss how predicate locking can be extended to *disjunctive* conditions such as queries of the form

```sql
SELECT name FROM employees WHERE position='Manager' OR department='Research';
```

Also discuss how *join* queries such as

```sql
SELECT e.name, e.department FROM employees e, department d
WHERE e.position='Manager' AND d.city='Toronto' AND e.department=d.department;
```

could be (conservatively) handled by predicate locking.

Exercise 3 (10 points) Consider the following B+-tree index on the attribute `accountnumber` of an `accounts` table. Assume that all tree nodes have a space capacity for holding up to four entries. Write down all locking and unlocking operations necessary for the execution of the following transaction, assuming incremental key range locking at the access layer and lock coupling at the page layer.

```sql
BEGIN TRANSACTION;
SELECT count(*) FROM accounts WHERE accountnumber BETWEEN 11 AND 25;
INSERT INTO accounts (accountnumber, ...) VALUES (27, ...);
COMMIT TRANSACTION;
```

![B+-tree diagram](image)