

Week 10

First part

Isolation level - Read committed

Step 1 (1st terminal)

```
dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# TABLE accounts;
 username |      fullname      | balance | group_id
-----+-----+-----+-----
 jones    | Alice Jones        |      82 |      1
 bitdiddl | Ben Bitdiddle      |      65 |      1
 mike     | Michael Dole       |      73 |      2
 alyssa   | Alyssa P. Hacker   |      79 |      3
 bbrown   | Bob Brown          |     100 |      3
(5 rows)
```

Step 2 (2nd terminal)

```
dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# UPDATE accounts SET username = 'ajones' WHERE username = 'jones';
UPDATE 1
dbcourse=#
```

Step 3 (1st terminal)

```
dbcourse=# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole       |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown          |     100 |      3
jones    | Alice Jones        |      82 |      1
(5 rows)
```

Step 4 (2nd terminal)

```
dbcourse=# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole       |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown          |     100 |      3
ajones   | Alice Jones        |      82 |      1
(5 rows)
```

Both terminals show different data, because we made started transaction in 2nd terminal, made changes and have not committed them.

Step 5 (2nd terminal)

```
dbcourse=# COMMIT;
COMMIT
```

1st terminal:

```
dbcourse=*# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole       |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown          |     100 |      3
ajones   | Alice Jones        |      82 |      1
(5 rows)
```

2nd terminal:

```
dbcourse=*# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole       |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown          |     100 |      3
ajones   | Alice Jones        |      82 |      1
(5 rows)
```

Now after commit they are the same.

Step 6 (2nd terminal)

```
dbcourse=# BEGIN TRANSACTION;
BEGIN
```

Step 7 (1st terminal)

```
dbcourse=*# UPDATE accounts SET balance = balance + 10 WHERE username = 'ajones';
UPDATE 1
```

Step 8 (2nd terminal)

```
dbcourse=# UPDATE accounts SET balance = balance + 20 WHERE username = 'ajones';
```

Update operation is stuck, because changes have been made in 1st terminal and they have not been committed, it waits for transaction completion.

Isolation level - Repeatable read

Step 1 (1st terminal)

```
dbcourse=# TABLE accounts;
```

username	fullname	balance	group_id
jones	Alice Jones	82	1
bitdiddl	Ben Bitdiddle	65	1
mike	Michael Dole	73	2
alyssa	Alyssa P. Hacker	79	3
bbrown	Bob Brown	100	3

(5 rows)

Step 2 (2nd terminal)

```
dbcourse=# UPDATE accounts SET username = 'ajones' WHERE username = 'jones';  
UPDATE 1
```

Step 3 (1st terminal)

```
dbcourse=# TABLE accounts;
```

username	fullname	balance	group_id
jones	Alice Jones	82	1
bitdiddl	Ben Bitdiddle	65	1
mike	Michael Dole	73	2
alyssa	Alyssa P. Hacker	79	3
bbrown	Bob Brown	100	3

(5 rows)

Step 4 (2nd terminal)

```

dbcourse=# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole        |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown           |     100 |      3
ajones   | Alice Jones         |      82 |      1
(5 rows)

```

Both terminals show different data, because we made started transaction in 2nd terminal, made changes and have not committed them.

Step 5 (2nd terminal)

After commit:

1st terminal:

```

dbcourse=# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
jones    | Alice Jones         |      82 |      1
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole        |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown           |     100 |      3
(5 rows)

```

2nd terminal:

```

dbcourse=*# COMMIT;
COMMIT
dbcourse=# TABLE accounts;
username |      fullname      | balance | group_id
-----+-----+-----+-----
bitdiddl | Ben Bitdiddle      |      65 |      1
mike     | Michael Dole       |      73 |      2
alyssa   | Alyssa P. Hacker   |      79 |      3
bbrown   | Bob Brown          |     100 |      3
ajones   | Alice Jones        |      82 |      1
(5 rows)

```

They also different, because isolation level is Repeatable read.

Step 7 (1st terminal)

```

dbcourse=*# UPDATE accounts SET balance = balance + 10 WHERE username = 'jones';
ERROR:  could not serialize access due to concurrent update

```

Step 8 (2nd terminal)

```

SET
dbcourse=*# UPDATE accounts SET balance = balance + 20 WHERE username = 'ajones';
UPDATE 1

```

Here we got error, because Repeatable read does not allow make concurrent changes.

Second part

Isolation level - Read committed

T1:

```

dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# SET TRANSACTION ISOLATION LEVEL READ COMMITTED;
SET
dbcourse=# SELECT * FROM accounts WHERE group_id = 2;
 username |  fullname  | balance | group_id
-----+-----+-----+-----
  mike    | Michael Dole |      73 |        2
(1 row)

```

T2:

```

ROLLBACK
dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# SET TRANSACTION ISOLATION LEVEL READ COMMITTED;
SET
dbcourse=# UPDATE accounts SET group_id = 2 WHERE username = 'bbrown';
UPDATE 1

```

T1:

```

dbcourse=# SELECT * FROM accounts WHERE group_id = 2;
 username |  fullname  | balance | group_id
-----+-----+-----+-----
  mike    | Michael Dole |      73 |        2
(1 row)

```

T1:

```

dbcourse=# UPDATE accounts SET balance = balance + 15 WHERE group_id = 2;
UPDATE 1

```

Commits are successful - Bob is moved to group 2, Michael got +15 balance.

Isolation level - Read committed

T1:

```

dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# SET TRANSACTION ISOLATION LEVEL REPEATABLE READ;
SET
dbcourse=# SELECT * FROM accounts WHERE group_id = 2;
 username |  fullname  | balance | group_id
-----+-----+-----+-----
  mike    | Michael Dole |      73 |        2
(1 row)

```

T2:

```

dbcourse=# BEGIN TRANSACTION;
BEGIN
dbcourse=# SET TRANSACTION ISOLATION LEVEL REPEATABLE READ;
SET
dbcourse=# UPDATE accounts SET group_id = 2 WHERE username = 'bbrown';
UPDATE 1

```

T1:

```

dbcourse=# SELECT * FROM accounts WHERE group_id = 2;
 username |  fullname  | balance | group_id
-----+-----+-----+-----
  mike    | Michael Dole |      73 |        2
(1 row)

dbcourse=# UPDATE accounts SET balance = balance + 15 WHERE group_id = 2;
UPDATE 1

```

Commits are successful - Bob is moved to group 2, Michael got +15 balance.
Here we got no errors, because we updated different blocks of data.