# Exercise 1:

## Read committed:

| Terminal 1: | Terminal 2: |
|---|---|
| username \| fullname \| balance \| group_id<br>----------+------------------+---------+----------<br>jones   \| Alice Jones    \|    82 \|    1<br>bitdiddl \| Ben Bitdiddle   \|    65 \|    1<br>mike    \| Michael Dole    \|    73 \|    2<br>alyssa   \| Alyssa P. Hacker \|    79 \|    3<br>bbrown  \| Bob Brown     \|   100 \|    3 | username \| fullname   \| balance \| group_id<br>----------+------------------+---------+----------<br>bitdiddl \| Ben Bitdiddle   \|    65 \|    1<br>mike    \| Michael Dole    \|    73 \|    2<br>alyssa   \| Alyssa P. Hacker \|    79 \|    3<br>bbrown  \| Bob Brown     \|   100 \|    3<br>ajones   \| Alice Jones    \|    82 \|    1 |

In first terminal anything didn't change because the transaction from the 2 terminal wasn't committed;

The second terminal didn't show anything, because there is one uncommitted transaction (in the 1 terminal);

## Repeatable read:

| Terminal 1: | Terminal 2: |
|---|---|
| username \| fullname \| balance \| group_id<br>----------+------------------+---------+----------<br>jones   \| Alice Jones    \|    82 \|    1<br>bitdiddl \| Ben Bitdiddle   \|    65 \|    1<br>mike    \| Michael Dole    \|    73 \|    2<br>alyssa   \| Alyssa P. Hacker \|    79 \|    3<br>bbrown  \| Bob Brown     \|   100 \|    3 | username \| fullname   \| balance \| group_id<br>----------+------------------+---------+----------<br>bitdiddl \| Ben Bitdiddle   \|    65 \|    1<br>mike    \| Michael Dole    \|    73 \|    2<br>alyssa   \| Alyssa P. Hacker \|    79 \|    3<br>bbrown  \| Bob Brown     \|   100 \|    3<br>ajones   \| Alice Jones    \|    82 \|    1 |

In first terminal anything didn't change because the transaction from the 2 terminal wasn't committed;

The first terminal get unchanged table and get an error:
*ОШИБКА:  не удалось сериализовать доступ из-за параллельного изменения*
since a Repeatable Read transaction cannot modify or lock rows that have been modified by other transactions since its beginning.

The second terminal updated the table successfully

# Exercise 2:

## Read committed:

| Terminal 1: | Terminal 2: |
|---|---|

```
username | fullname    | balance | group_id        username | fullname    | balance | group_id
---------+-------------+---------+----------        ---------+-------------+---------+----------
jones    | Alice Jones    |   82 |    1            jones    | Alice Jones    |   82 |    1
bitdiddl | Ben Bitdiddle  |   65 |    1            bitdiddl | Ben Bitdiddle  |   65 |    1
alyssa   | Alyssa P. Hacker |  79 |    3           alyssa   | Alyssa P. Hacker |  79 |    3
bbrown   | Bob Brown      |  100 |    2            bbrown   | Bob Brown      |  100 |    2
mike     | Michael Dole   |   88 |    2            mike     | Michael Dole   |   88 |    2
```

Bob's balance didn't change because when adding 15 to all from group 2, he wasn't in this group as the terminal 2 didn't yet committed the thansaction for Bob's changing group id

## Repeatable read:

| Terminal 1: | Terminal 2: |
|---|---|
| ```
username | fullname    | balance | group_id
---------+-------------+---------+----------
jones    | Alice Jones    |   82 |    1
bitdiddl | Ben Bitdiddle  |   65 |    1
alyssa   | Alyssa P. Hacker |  79 |    3
bbrown   | Bob Brown      |  100 |    2
mike     | Michael Dole   |   88 |    2
``` | ```
username | fullname    | balance | group_id
---------+-------------+---------+----------
jones    | Alice Jones    |   82 |    1
bitdiddl | Ben Bitdiddle  |   65 |    1
alyssa   | Alyssa P. Hacker |  79 |    3
bbrown   | Bob Brown      |  100 |    2
mike     | Michael Dole   |   88 |    2
``` |

The same result here:
Only Michael's balance is changed by 15, since we before change the balance for those whose group_id is equal to 2, and only then commit changes Bob's group_id.

# Exercise 3:

### Repeatable read:

| Terminal 1: | Terminal 2: |
|---|---|
| ```
username | fullname    | balance | group_id
---------+-------------+---------+----------
alyssa   | Alyssa P. Hacker |  79 |    3
bbrown   | Bob Brown      |  100 |    3
jones    | Alice Jones    |   82 |    1
bitdiddl | Ben Bitdiddle  |   65 |    1
mike     | Michael Dole   |  146 |    2
``` | ```
username | fullname    | balance | group_id
---------+-------------+---------+----------
alyssa   | Alyssa P. Hacker |  79 |    3
bbrown   | Bob Brown      |  100 |    3
jones    | Alice Jones    |   82 |    1
bitdiddl | Ben Bitdiddle  |   65 |    1
mike     | Michael Dole   |  146 |    2
``` |

The same results:
only Michael's balance has changed as only he was in the 2 group when we made changes in balances (we didn't commit Bob's group_id change).
Bob's group_id is also updated in the final table, but only after the committing we can see this update from the 1 terminal. That is the reason why his balance is not updated.

## Serializable:

| Terminal 1: | Terminal 2: |
|---|---|
| error | username \| fullname \| balance \| group_id<br>----------+------------------+---------+----------<br>mike    \| Michael Dole    \|    73 \|     2<br>alyssa   \| Alyssa P. Hacker \|    79 \|     3<br>jones    \| Alice Jones     \|    82 \|     1<br>bitdiddl \| Ben Bitdiddle   \|    65 \|     1<br>bbrown   \| Bob Brown      \|    100 \|     2 |

When trying commit the 1 terminal after 2 was committed we gor error:
*ОШИБКА:  не удалось сериализовать доступ из-за зависимостей чтения/записи между транзакциями*
*ПОДРОБНОСТИ:  Reason code: Canceled on identification as a pivot, during commit attempt.*
*ПОДСКАЗКА:  Транзакция может завершиться успешно при следующей попытке.*

None of the balances didn't change as we have committed 2 terminal transaction first and in terms of the concept of serialization, these transactions cannot be serialized