

Spring Professional Exam Tutorial v5.0

Question 12

Question 12 - What is a transaction isolation level? How many do we have and how are they ordered?

Transaction Isolation determines how changes made under one transaction are visible in other transactions and to other users of the system. Higher isolation level means that changes from one transaction are not visible and lower isolation level means that changes from one transaction may “slip” into selects executed under other transaction.

Higher transaction isolation level make data being visible in more consistent way, lower transaction isolation level makes data less consistent but increases overall throughput and concurrency of the system.

Question 12 - What is a transaction isolation level? How many do we have and how are they ordered?

There are three challenges that may occur due to Transaction Isolation Level:

- ▶ Phantom Read
- ▶ Non-repeatable Read
- ▶ Dirty read

Question 12 - What is a transaction isolation level? How many do we have and how are they ordered?

Phantom read:

- ▶ Transaction A - first read

- ▶ `select id, first_name, last_name from employees where id between 5 and 10`

- ▶ Transaction B - write

- ▶ `insert into employees values(7, 'John', 'Doe');`

- ▶ Transaction A - second read

- ▶ `select id, first_name, last_name from employees where id between 5 and 10`

High Isolation Level will make second read returning same values as first read, lower isolation level will include new row with id 7 in second read.

To prevent phantom read, you need to pick isolation level that uses range locks.

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Non-repeatable read:

- ▶ Transaction A - first read

- ▶ `select id, first_name, last_name from employees where id = 5`

- ▶ Transaction B - write & commit

- ▶ `update employees set last_name = 'Doe' where id = 5`

- ▶ Transaction A - second read

- ▶ `select id, first_name, last_name from employees where id = 5`

High Isolation Level will make second read returning same values as first read, lower isolation level will read new values for record 5.

To prevent non-repeatable reads you need to use isolation level that uses read-write locks on data being processed.

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Dirty read:

- ▶ Transaction A - first read

- ▶ `select id, first_name, last_name from employees where id = 5`

- ▶ Transaction B - write (commit does not have to happen)

- ▶ `update employees set last_name = 'Doe' where id = 5`

- ▶ Transaction A - second read

- ▶ `select id, first_name, last_name from employees where id = 5`

High Isolation Level will make second read returning same values as first read,
lower isolation level will read new values for record 5, even if Transaction B will not commit the data.

To prevent dirty reads you need to use isolation level that prevents uncommitted changes by other transaction being visible in your transaction.

Question 12 - What is a transaction isolation level? How many do we have and how are they ordered?

Most Relational Databases support 4 transaction levels:

- ▶ **Serializable**
 - ▶ Highest Isolation Level
 - ▶ Read-Write Locks held until end of transaction
 - ▶ Range Locks held until end of transaction
- ▶ **Repeatable Read**
 - ▶ Read-Write Locks held until end of transaction
- ▶ **Read Committed**
 - ▶ Read Locks held until end of select statement
 - ▶ Write Locks held until end of transaction
- ▶ **Read Uncommitted**
 - ▶ Lowest isolation level
 - ▶ It is possible to see changes from other transactions that are not committed

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In Spring Framework, you can use `@Transactional` annotation to set isolation level.

```
@Transactional(isolation = Isolation.SERIALIZABLE)

@Transactional(isolation = Isolation.REPEATABLE_READ)

@Transactional(isolation = Isolation.READ_COMMITTED)

@Transactional(isolation = Isolation.READ_UNCOMMITTED)
```


Question 12 - What is a transaction isolation level? How many do we have and how are they ordered?

Isolation Level	Phantom Read	Non-repeatable Read	Dirty Read	Concurrency
Serializable	Not possible	Not possible	Not possible	Very poor
Repeatable Read	Possible	Not possible	Not possible	Poor
Read Committed	Possible	Possible	Not possible	Good
Read Uncommitted	Possible	Possible	Possible	Very Good

