



Assignment Project Exam Help

Database Transactions – Part 1

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Transaction – A Classical Example

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- Scenario: Suppose that Steve's account balance is \$1000 and Bob's balance is \$200. Now Steve wants to transfer \$500 into Bob's account.

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- 3 Check Bob's balance;

- 4 Update Bob's balance.

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- Steve later checked his balance (it was \$
However, Bob told Steve that he hadn't received his money yet (still \$200 in
Bob's account instead of \$700).

Question: What did happen?



Transaction – A Classical Example

- **Reason:** Due to power outage, the system ~~stopped working just after~~ updating Steve's balance
- **Task:** Transfer \$500 from Steve's account to Bob's account



```
SET balance = balance-500
```

```
WHERE name='Steve';
```

```
SELECT balance FROM ACCOUNT
```

```
WHERE name = 'Bob';
```

```
UPDATE ACCOUNT
```

```
SET balance = balance+500
```

```
WHERE name = 'Bob';
```

Operations	Steve	Bob
		\$200
		\$200
		\$200
		\$200
after 4	\$500	\$700

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Transaction – A Classical Example

- We need an approach to ensure that
 - either the balances of Steve and Bob remain unchanged if the money transfer fails

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```
WHERE name = 'Steve';
```

```
2 UPDATE ACCOUNT  
SET balance = balance-500  
WHERE name='Steve';
```

```
3 SELECT balance FROM ACCOUNT  
WHERE name = 'Bob';
```

```
4 UPDATE ACCOUNT  
SET balance = balance+500
```

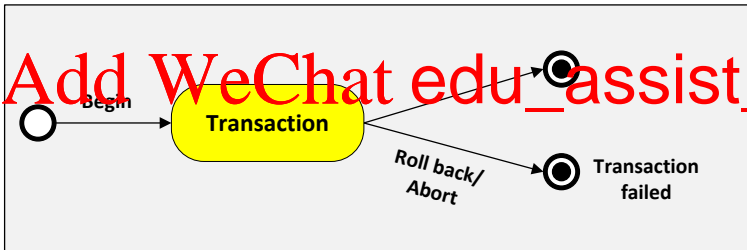
		Bob
		\$200
		\$200
after 2	\$500	\$200
after 3	\$500	\$200
after 4	\$500	\$700



What is a Transaction?

- DBMSs provide **transaction support** for solving this kind of problem
- A **transaction** is a sequence of database operations grouped together for execution as a **logic unit** in a DBMS.

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What is a Transaction?

- Database applications often access a database by transactions rather than individual operations.



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- multiple users may modify and share data at the same time
- transaction, system, and media failures may occur

- What does a transaction look like?**

- `INSERT`, `SELECT`, `UPDATE`, `DELETE`, `BEGIN`, `COMMIT`, `ABORT` (`ROLLBACK`), etc. from a high-level language perspective;
- `read`, `write`, `begin`, `commit`, `abort` at the internal process level.



Transaction – Language Level

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Database operations of a transaction (at the SQL language level) may include: **SELECT, INSERT, UPDATE, DELETE.**

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2 UPDATE ACCOUNT

SET balance = balance-500 WHERE name='S

3 SELECT balance FROM ACCOUNT W

4 UPDATE ACCOUNT

SET balance = balance+500 WHERE name = 'Bob';

COMMIT



Transactions - Internal Process Level

- Basic operations of a transaction (at the internal process level) are

- **read(X)**: loads object X into main memory;



o disk

- G

- Other operations:

- **begin**: marks the beginning of a transaction

- **commit**: signals a successful end of the transaction
safely be applied to the database permanently;

- **abort**: signals the transaction has ended unsuccessfully - undo all operations of the transaction.



Transactions - Internal Process Level

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```
T: BEGIN TRANSACTION
T: SELECT balance FROM Account WHERE name = 'Steve';
T: UPDAT
T: SELEC
T: UPDAT
T: COMMI
```

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Objects:

- A - Steve's account balance;
- B - Bob's account balance.

Steps	
1	
2	
3	read(B)
4	write(B) (B:=B+500)
5	commit

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