

# DATABASE MANAGEMENT ISSUES IN MOBILE COMPUTING

## Lesson 05

### Database Transaction Model

# TRANSACTION

- Means execution of interrelated instructions in a sequence for a specific operation on a database
- Database transaction models must maintain data integrity and must enforce a set of rules called ACID rules

# ACID RULES

1. Atomicity
2. Consistency
3. Isolation
4. Durability

# 1. ATOMICITY

- All operations of a transaction must be complete
- In case, a transaction cannot be completed; it must be undone (rolled back)
- Operations in a transaction are assumed to be one indivisible unit (atomic unit)

## 2. CONSISTENCY

- A transaction must be such that it preserves the integrity constraints and follows the declared consistency rules for a given database
- Consistency means the data is not in a contradictory state after the transaction

# CONSISTENCY

- The amount transferred must be subtracted from account *A* and added into account *B*
- Consistency means that the sum total of the balances in accounts *A* and *B* is the same as it was before the transaction

# 3. ISOLATION

- If two transactions are carried out simultaneously, there should not be any interference between the two
- Further, any intermediate results in a transaction should be invisible to any other transaction

## 4. DURABILITY

- After a transaction is completed, it must persist and cannot be aborted or discarded
- For example, in a transaction entailing transfer of a balance from account *A* to account *B*, once the transfer is completed and finished there should be no roll back

# MICROSOFT.NET

- Consider a base class library included in .NET. It has a set of computer software components called ActiveX Data Objects in .NET (ADO.NET).
- Objects can be used to access data and data services, including accessing and modifying the data stored in relational database systems.

# BEGIN, COMMIT AND ROLLBACK

- Three transaction commands:
- *BeginTransaction* Any operation after *BeginTransaction* is assumed to be a part of the transaction till the *CommitTransaction* command or the *RollbackTransaction* command is executed.

# ADO.NET (ACTIVEX DATA OBJECTS IN .NET)

- BeginTransaction: It is used to begin a transaction.
- Any operation after BeginTransaction is assumed to be a part of the transaction till the CommitTransaction command or the RollbackTransaction command

# AUTO-COMMIT MODE

- Means that the transaction is finished automatically even if an error occurs in between
- `set autocommit = 1`

# ADO.NET

- `connectionA.open();`
- `transA = connectionA.BeginTransaction();`
- Here, `connectionA` and `transA` are two distinct objects.
- `transA.Commit();`
- All statements between `BeginTransaction` and `commit` must execute atomically

# SUMMARY

- Atomicity in transactions
- Consistency in transactions
- Isolation in transactions
- Durability in Transactions...

# End of Lesson 05

## Database Transaction Model