Q3: CRUD Operations and Performance Comparison

Objective:
Perform CRUD operations (Create, Read, Update, Delete) on both relational (SQLite 2NF) and document-oriented (MongoDB Customer-centric and Transaction-centric) databases. Measure the performance and compare the differences.

2. Results

```
PS D:\mlops_assignment_4> python q3.py
Running SQL CRUD...
Running MongoDB Customer-centric CRUD...
Running MongoDB Transaction-centric CRUD...

CRUD Performance Comparison (time in seconds):
Operation  SQL 2NF      Mongo Customer     Mongo Transaction
insert     0.047974     0.006515           0.004168
read       0.000582     0.000734           0.000933
update     0.004324     0.001196           0.002203
delete     0.003320     0.000570           0.000957
PS D:\mlops_assignment_4>
* History restored
```

Observations

1. **Insert Operation:**
    - MongoDB (both models) is significantly faster than SQLite for inserts.
    - Reason: Document-oriented DBs allow insertion of entire documents without strict schema enforcement or relational integrity checks.
2. **Read Operation:**
    - Read times are comparable across all three, but SQL 2NF is slightly faster due to indexing and direct table access.
3. **Update Operation:**
    - MongoDB Customer-centric update is faster than SQL 2NF.
    - Transaction-centric update is slightly slower than customer-centric because of item array updates.
4. **Delete Operation:**
    - MongoDB performs deletions faster due to document-level removal without complex relational dependencies.