1. Introduction

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Nine capabilities of a DBMS by Codd

1. Integration
2. Operations
3. Catalog
4. Views
5. **Consistency Control**
6. Data Protection
7. **Transactions**
8. **Synchronization**
9. **Recovery**

Transaction properties

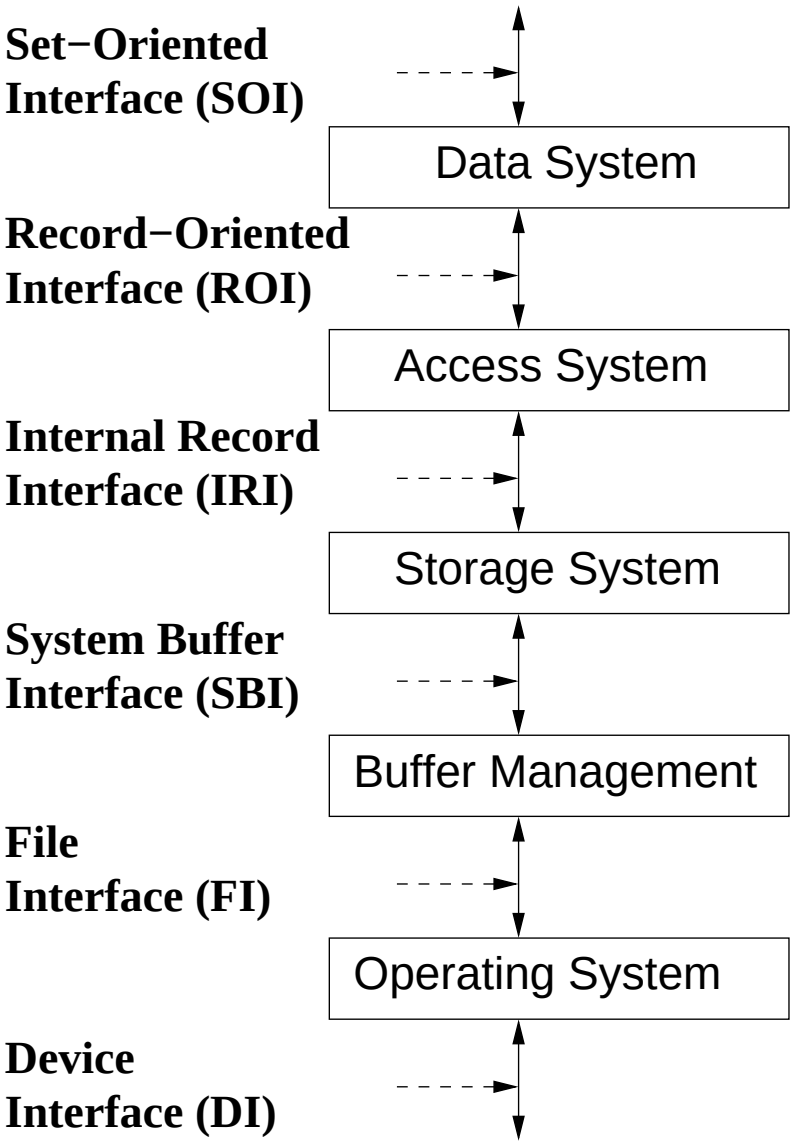
A transaction is a sequence of operations (actions), which transfers a database from a consistent state into another eventually changed consistent state, applying the ACID properties.

- Aspects:
  - Semantic integrity: Correct (consistent) database state after the end of transactions
  - run-time integrity: Avoid errors caused by simultaneous access of several users to the same data

ACID Properties

- **A**tomicity:
  Transactions are either completed, or not performed at all.
- **C**onsistency:
  If the database is in a consistent state before a transaction starts, the database is also consistent after the transaction has ended.
- **I**solation:
  A user who is working on the database should not notice any other user working on it.
- **D**urability:
  The result of a transaction must be permanently stored within the database, after the transaction is completed.

Architecture of DBMS



Translation, Acces Path Selection, Access Control, Integrity Control

Data Dictionary, Currency Pointer, Sorting, Concurrency Control

Record Manager, Access Path Management, Lock Management, Log/Recovery

System Buffer Management with Page Replace Strategy

External Storage Management

Storage hierarchy