Failure ——— Atomicity

Recov.: Never modify only copy

Isolation → Serializability

Locks

Two-phase locking
Deadlocks

1) Timers
2) Waits for graph
Logs & Locks
Applications

1) Transactions
   Consistency
   Durability

2) Multi-site atomicity
Transactions

A → C → I → D → Invariants must hold

Permanence
## Centralized

### Integrity rules

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Distributed Data

- DNS → Expiration time
- Web caches
  “if-modified-since”

Strong cons:
Read returns result of last write
Eventual consistency
1) Write-thru cache
2) Snoopy cache