CS743 - Principles of Database Management and Use

Distribution, Replication, and CAP

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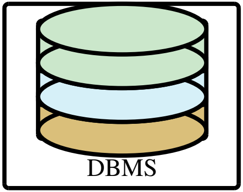
Data Partitioning



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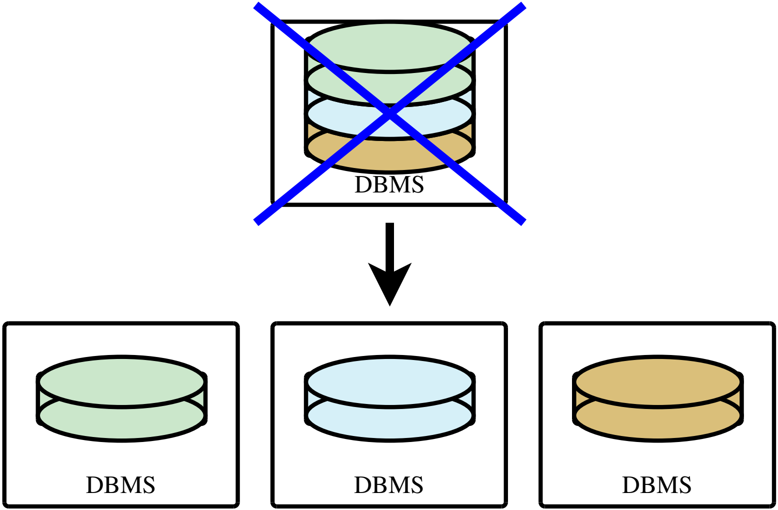
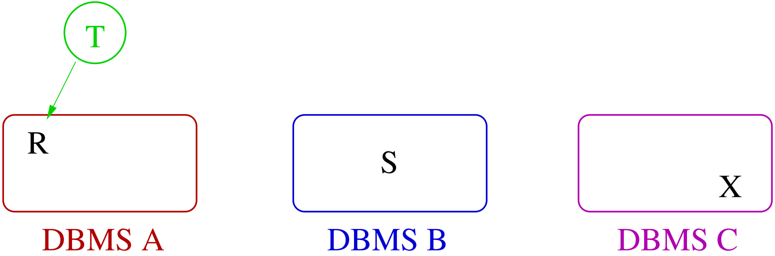
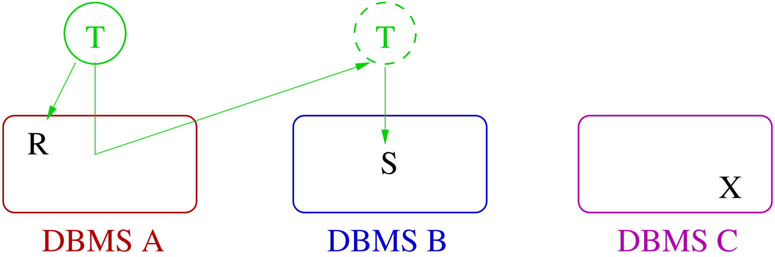


Two Phase Commit (2PC)



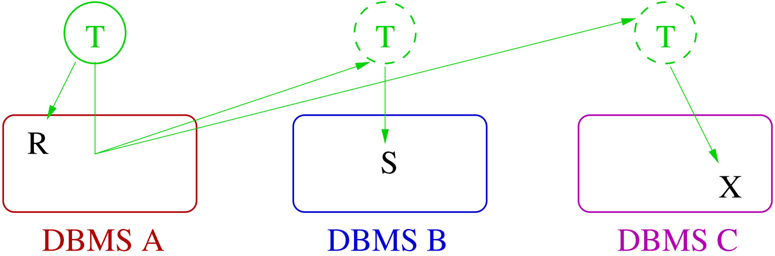
1. `UPDATE R`

Two Phase Commit (2PC)



1. `UPDATE R`
2. `UPDATE S`

Two Phase Commit (2PC)



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3. `UPDATE X`

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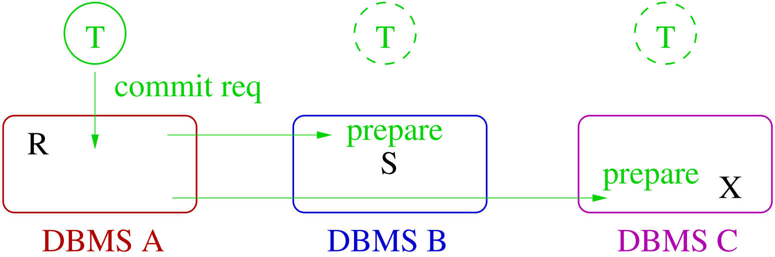

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   - 2PC phase 1

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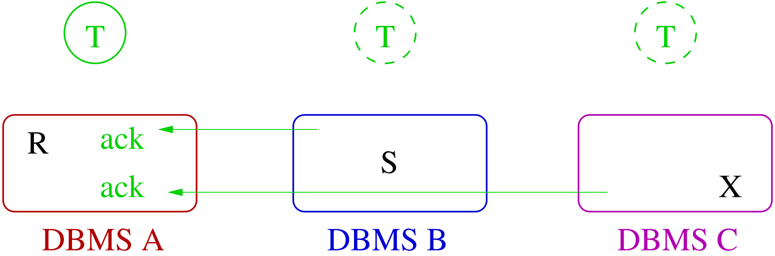

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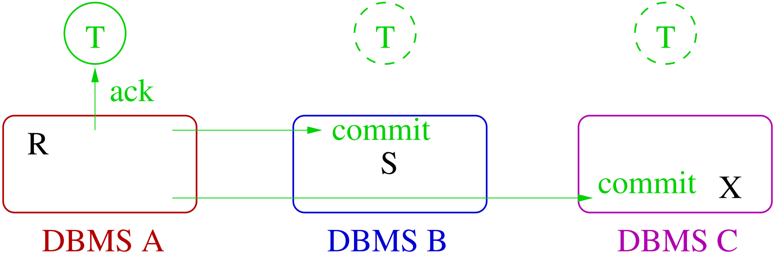

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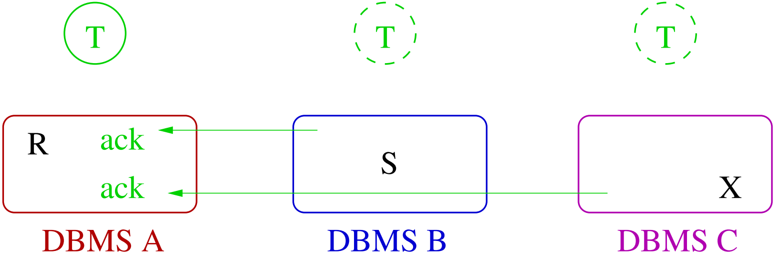

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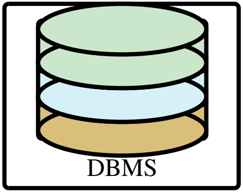
Strict 2PL at each site plus 2PC ensures global serializability.

Data Replication



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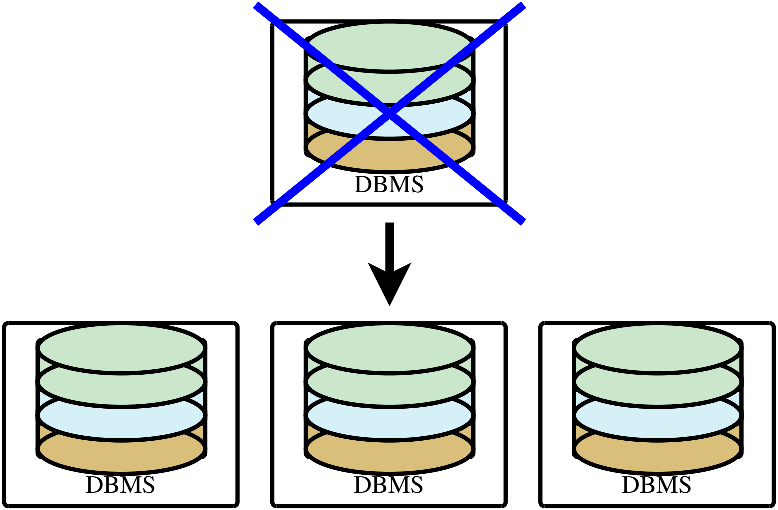

1-Copy Serializability (1SR)

- correctness criterion suitable for replicated databases
- system behaves as if there is a single copy of each object on which transactions appear to execute sequentially in some order

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Global Serializability

Local strict two-phase locking $+$ 2PC for commit coordination is sufficient to ensure global 1SR.

CAP

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Partition-Tolerance: system should remain consistent and available even if it partitions

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Brewer's CAP Conjecture (PODC 2000)

It is impossible build a [distributed database] system that provides consistency, availability, and partition-tolerance.