

Replication

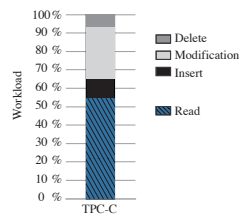
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Transactions

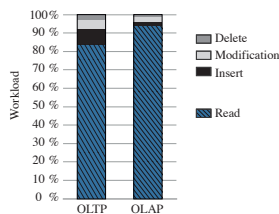
- A transaction is a set of changes, that are applied to the database in an ***atomic*** way, i.e. either all or no changes/ inserts of the transaction are visible to other programs.
- A transaction's changes become visible, when the transaction is ***committed***
- Transactions are grouped into group-commit phases, and committed together
- Solved with *validFrom* and *validTo* timestamps in Sanssouci DB
- We differentiate between *modifying* and *read-only* transactions

Motivation for Replication

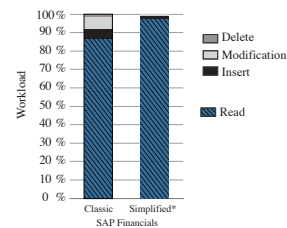
- Unified database system → OLTP and OLAP workload
- Heavy read-only OLAP queries responsible for the majority of the workload
- Complex OLAP queries on transactional schema
- **Solution:** Replicate data to handle read-only queries on separate systems



3 (a) TPC-C Benchmark



(b) Workload Analysis
Krueger et al. VLDB'11



(c) SAP Financials
Workload Analysis

Replication

- Only committed transactions are replicated
- Order of transactions is always kept
 - If transaction ID 7 is visible on a replica, all smaller transactions are visible as well
- Transactions are replayed asynchronously on replica
 - Different replicas have different workload, can replay at their own pace
 - Master is not slowed down by replay speed of replicas
 - For OLAP, a snapshot of a few seconds ago is sufficient

Requirements for Replication

- All replicas have a consistent snapshot of the primary database
- Delay between master and replicas low (< 1 second)
- Replicas only handle read-only workload

