Efficient Black-box Checking of Snapshot Isolation in Databases

(Conference VLDB'2024)

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August 5, 2023

Database Transactions

A database transaction is a *group* of operations that should be executed atomically.

Isolation Levels

When multiple transactions are executed concurrently,

the isolation levels specify how they are isolated from each other.

Serializability (SER)

All transactions appear to execute serially, one after another.

too expensive, especially for distributed transactions

Snapshot Isolation (SI)

defs and examples

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avoid the performance penalty of SER

prevent undesirable common data anomalies such as fractured reads, causality violations, and lost updates

Snapshot Isolation (SI)

database logos

Snapshot Isolation (SI)

Database systems may fail to provide SI as they claim.
+papers

The SI Checking Problem

Given a history H of a database system,

to decide whether H satisfies SI?

+fig

Motivation: Black-box SI Checker

Since the internals of database systems are often unavailable or are hard to understand,

a *black-box* SI checker is highly desirable.

Motivation: Black-box SI Checker

A black-box SI checker should be

Sound: return no false positives

Complete: miss no violations

Informative: report understandable counterexamples

Efficient: run in a reasonable time even for large workloads

Motivation: Black-box SI Checker

related-work

Contributions

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