

WHAT ARE WE DOING WITH OUR LIVES?

NOBODY CARES ABOUT
OUR CONCURRENCY
CONTROL RESEARCH

SIGMOD 2017

I am only allowed 3 plugs in this talk.



Allows a DBMS to mask the latency of non-volatile storage.

Pioneering work on transaction processing from the 1970s.



Jim Gray



New concurrency control schemes are needed if the database is assumed to be in memory.

Early research in 1980s.

Some commercial DBMSs from 1990s.

Partitioned Protocols

→ H-Store (VLDB 2007)

Non-Partitioned Protocols

- → Microsoft Hekaton (VLDB 2011)
- → **Silo** (SOSP 2013)

All of this research is great for "classic" OLTP applications.

We are not addressing the needs of new fields and environments.

Peter Bailis examined real-world DB applications. Few of them use txns and many of them don't use them correctly.

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We did an automated evaluation with the CMDBAC corpus. Few apps written in popular frameworks use txns.

Assumption #1: All transactions execute as <u>stored procedures</u>.

Assumption #2: All transactions execute with <u>serializable isolation</u>.

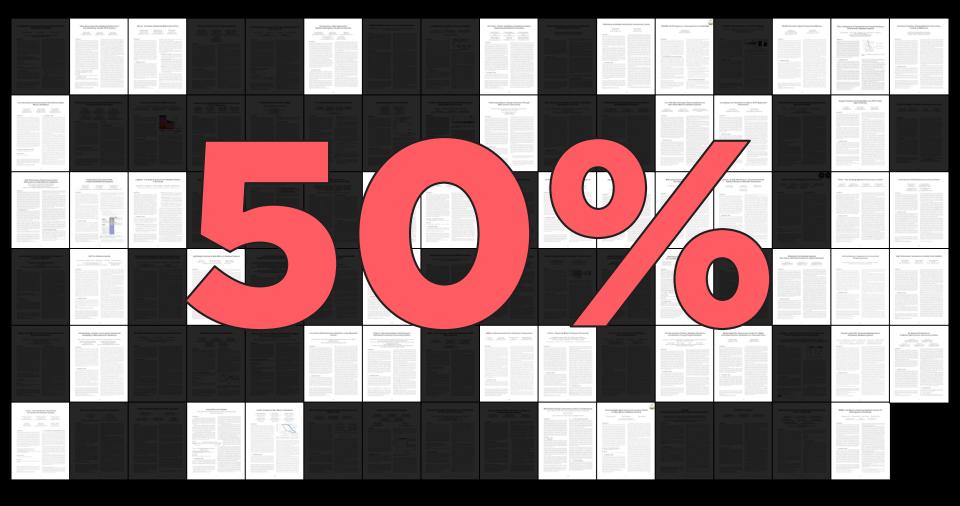
Examined SIGMOD and VLDB publications from 2011-2016.

We found 95 out of 1843 (5%) papers on transaction processing and concurrency control.

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We commissioned a survey of DBAs in April 2017 on how applications use databases.

50 responses for 79 DBMS installations.

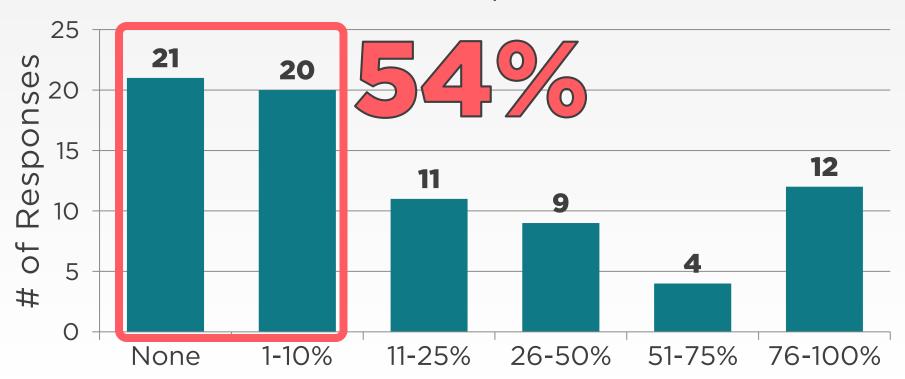




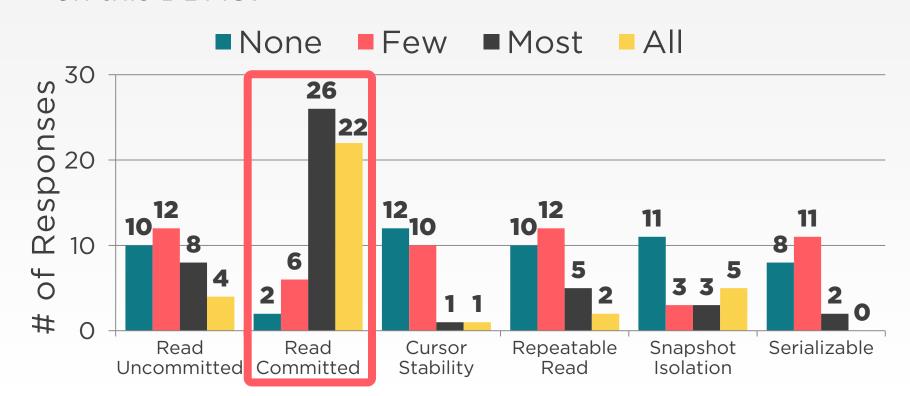


+Nine others

What percentage of the transactions run on your DBMS are executed as stored procedures?



What isolation level do transactions execute at on this DBMS?



Stored Procedures

- → Software engineering challenges.
- → Don't want devs to update too often.

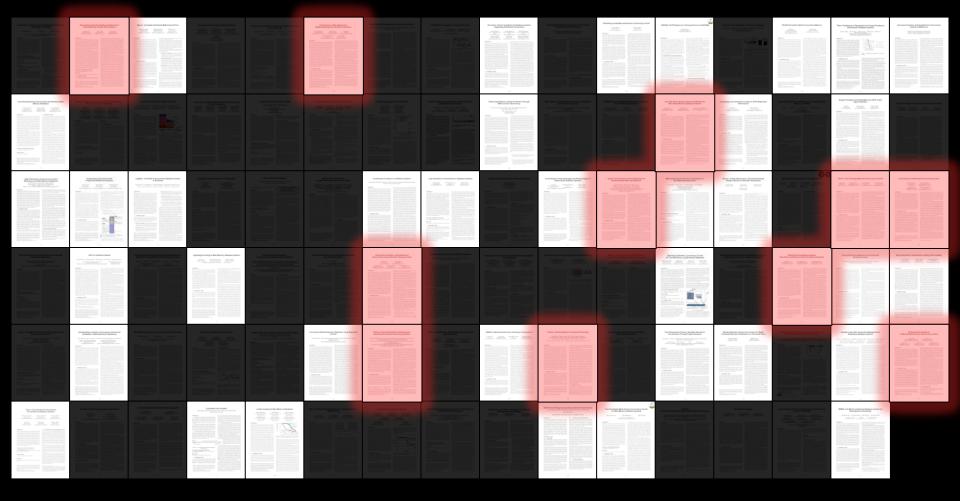
Serializable Isolation

- → It was always done this way.
- → Not worth the overhead.

Assuming that every txn executes as a stored procedure with serializable isolation changes the bottleneck.

You end up optimizing things that are not as important as you think...

Aren't I being hypocritical?



Prospective Students

Current Students

Faculty

Staff

ACADEMICS

APPLY

FACULTY POSITIONS

NEWS & EVENTS DIRECTORY RESEARCH

ABOUT CSD



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Administrative Support Person:

Jessica Packer

Research Interests:

#1 - My Wife

#2 - Databases

- → Examine Entire DBMS Architecture
- → Communication Overhead
- → Understand Lower Isolation Levels

The DBMS's concurrency control protocol is not the only critical part of executing txns in a DBMS.

MEET THE PEOPLE

The prote

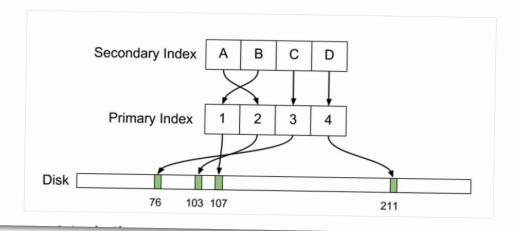
IN-ME

CONC

ARCHITECTURE

WHY UBER ENGINEERING SWITCHED FROM POSTGRES TO MYSQL

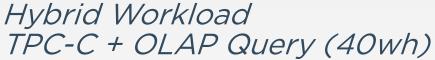
BY EVAN KLITZKE

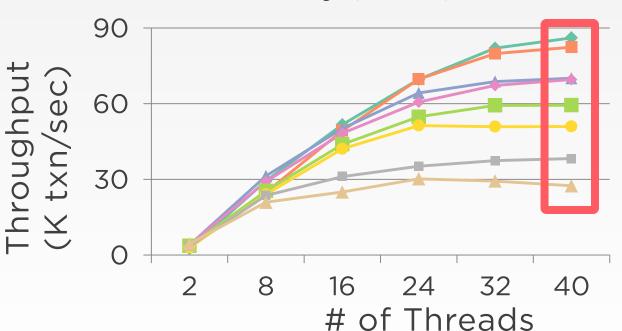


The DBMS's concurrency control protocol is not the only critical part of executing txns in a DBMS.

- → Secondary Indexes
- → Version Storage / Ordering
- → Garbage Collection

IN-MEMORY MULTI-VERSION CONCURRENCY CONTROL STUDY





MVCC Configurations

- →Oracle/MySQL
- -NuoDB
- **→**HYRISE
- → MemSQL
- HyPer
- -SAP HANA
- ---Hekaton
- **→**Postgres



AN EMPIRICAL EVALUATION OF IN-MEMORY MULTI-VERSION CONCURRENCY CONTROL VLDB 2017

Most applications are in the same data center as the DBMS machine.

Kernel bypass methods:

- → RDMA
- → Intel DPDK

Prefetching with machine learning.

We don't understand how applications are affected by lower isolation levels.

Maybe READ COMMITTED is good enough or maybe people don't know how dirty their data actually is...

It is (still) an interesting time for database research. Let's make sure we work on the right problems.

We need a better way of collecting information about applications.

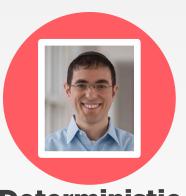


Serializable
Snapshot Isolation

Michael Cahill

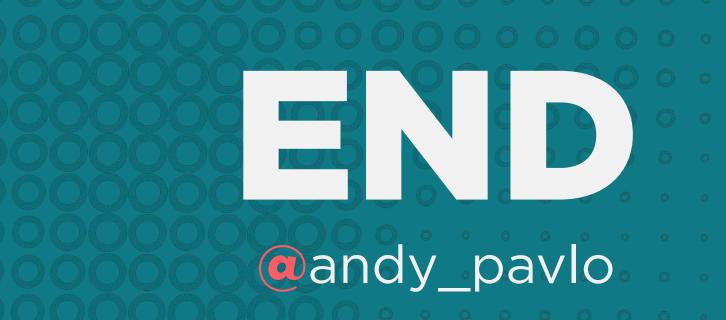






Deterministic
Concurrency Control
Dan Abadi







Joy Arulraj Winter 2018

