Optimizing Distributed Read-Only Transactions Using Multiversion Concurrency

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Distributed Transactions

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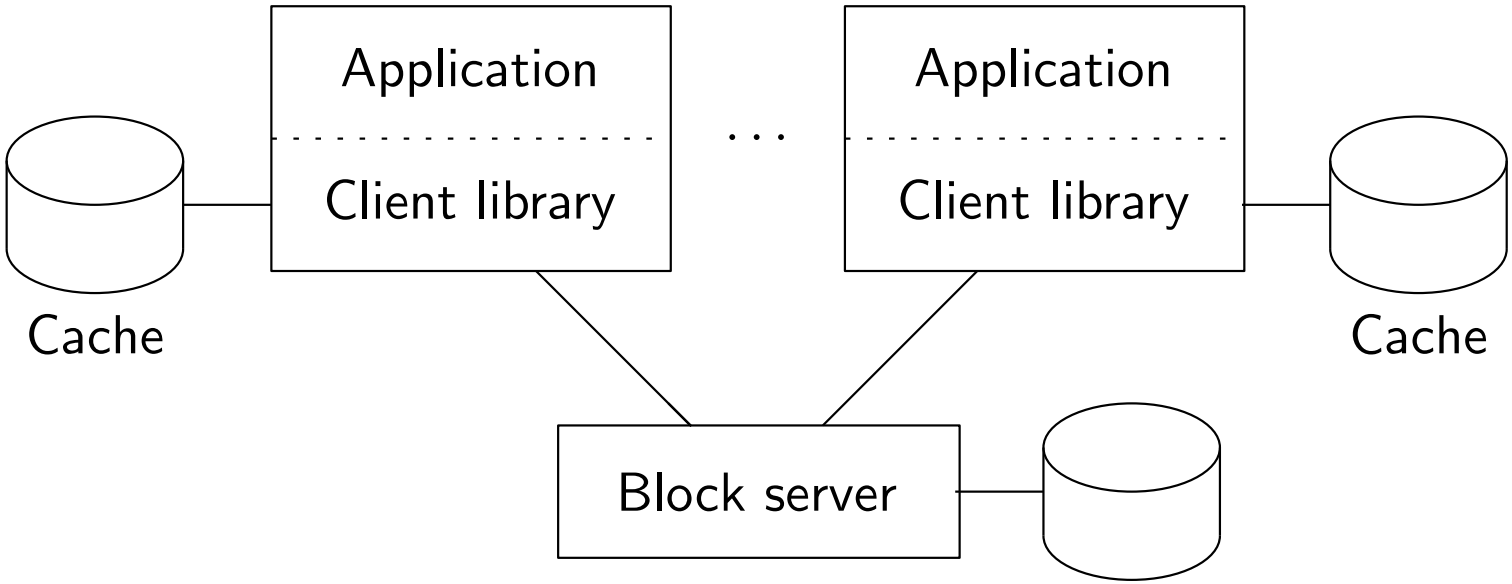
...but slow

System Architecture



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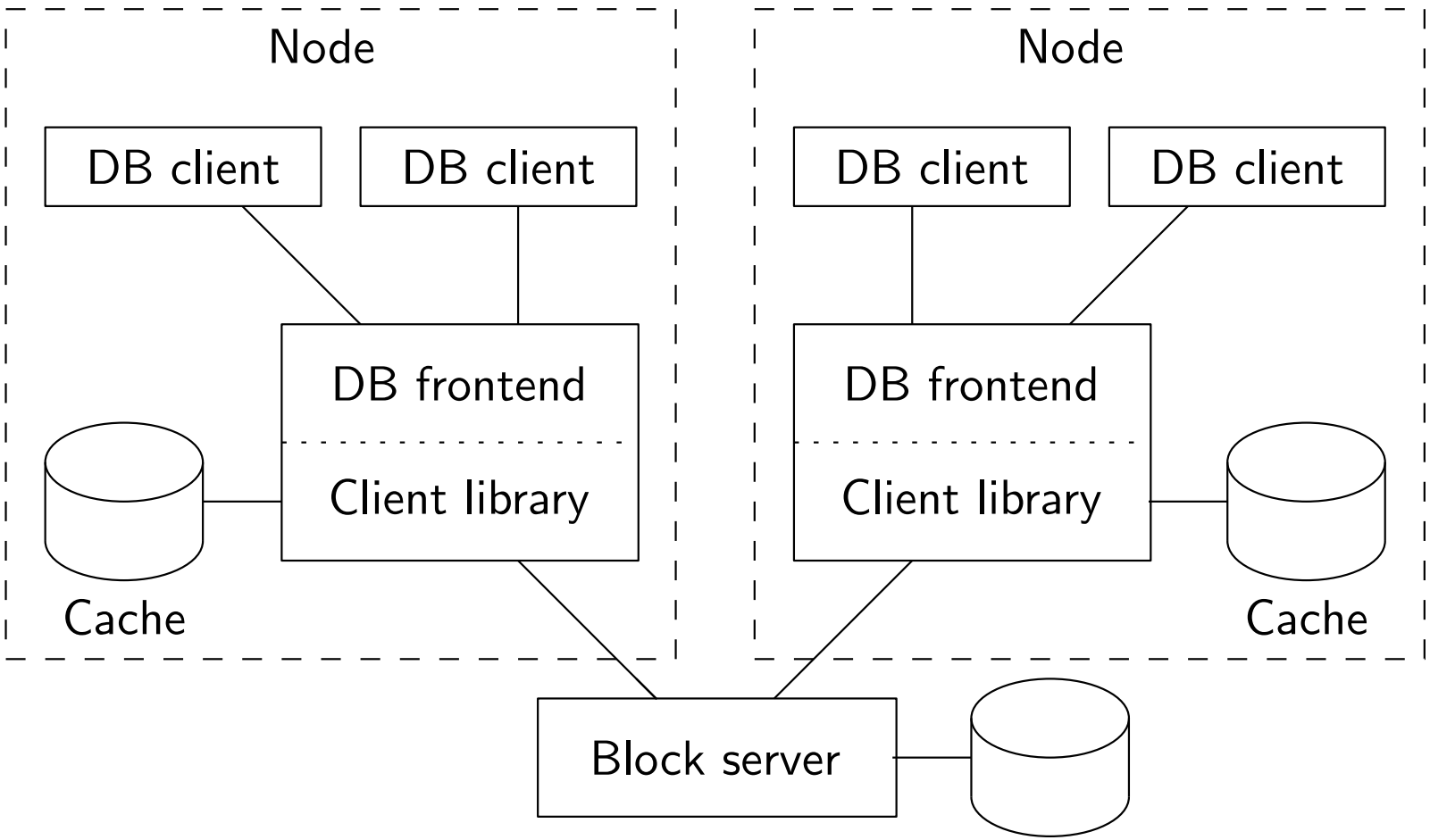

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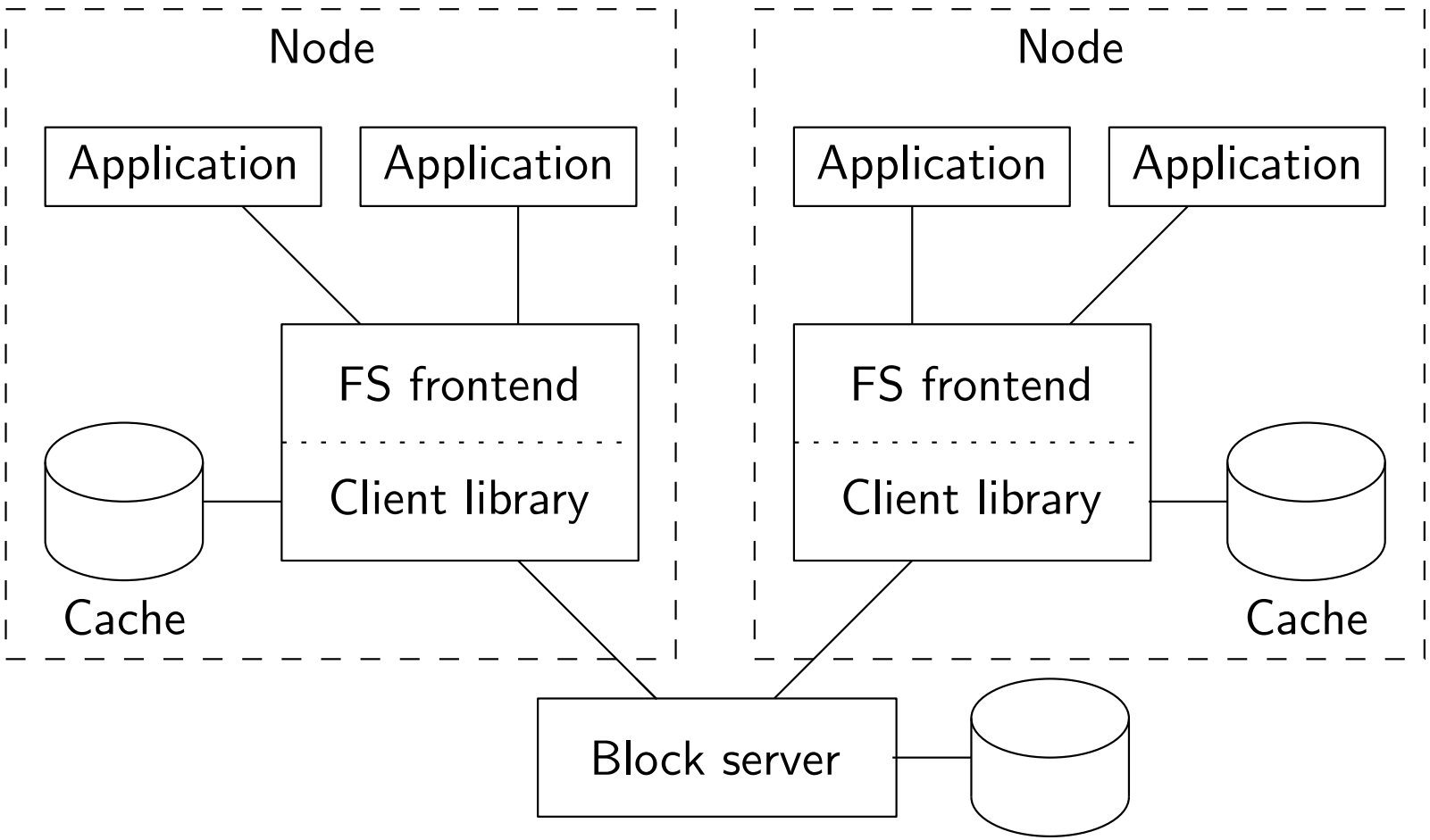

Distributed Transactions Can Be Fast

Lower isolation levels?

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Our solution:

weaken *causality* instead of *serializability*

- All operations transactionally consistent
- Read only transactions may run slightly in past

Properties

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Anomaly: acausality

A read-only transaction may not see the results of a transaction that just committed on another node.

Performance

- Built `ext2`-like filesystem atop block store
- Replayed 20,000 operations over 13 minutes from Berkeley NFS server trace
- 116 parallel clients
- Inferred transactions (open-close)
- 2 second allowable staleness
- Compared against standard OCC

Performance

	Plain OCC	Read-Opt.	Improvement
Network	15.0 MB	11.0 MB	27%
Aborts	392	22	94%
CPU time	14.5 min.	35 sec.	96%