Simplifying Multithreading & Boosting Performance
Programming with Transactional Memory

Transactional memory provides an easy-to-use mechanism for controlling concurrent access to shared data

- Simple programming model – transactions guarantee atomicity and isolation
- Underlying implementation provides scalability and performance
- Avoids common problems of lock-based synchronization

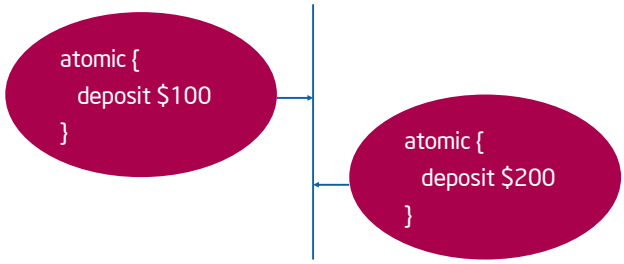
Multi-threaded programs require concurrency control

John and Mary Smith have $1000 in a joint account.

Thread 1: John deposits $100	Thread 2: Mary deposits $200
1. bal = acc.get ("Smith")	3. bal = acc.get ("Smith")
2. bal = bal + 100 (= $1100)	4. bal = bal + 200 (= $1200)
6. acc.put ("Smith", bal)	5. acc.put ("Smith", bal)

Account balance is $1100. Mary and John lost $200.

Transactions



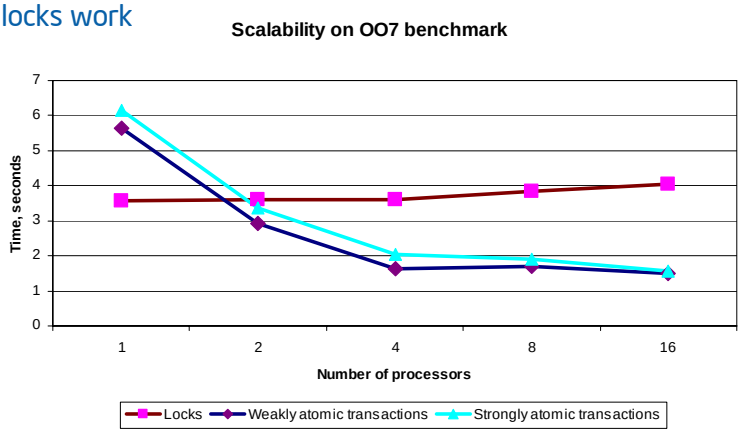
Strong atomicity provides an intuitive programming model

Weak atomicity

- Commonly accepted model for software transactional memory
- Falsely assumes only transactions access shared data
- May lead to unintuitive implementation-dependent behavior
- Fails where locks work

Strong atomicity

- Always guarantees transactional properties
- Treats all memory operations as mini-transactions
- May impose overhead on non-transactional code
- Allows for more reliable multi-threaded programming



Programming Systems Lab

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