D²T: Doubly Distributed Transactions for High Performance and Distributed Computing

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HPDC 2013
June 18, 2013

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Doubly Distributed Transactions for HPDC

- Need guarantees operations are complete and correct
  - Eventual consistency not good enough (space/time constraints)
  - Paxos/Zookeeper (and others) 1xN only

- Full ACID properties possible (with sufficient hardware support)

- MxN at extreme scale hard
  - 10 million clients to 10000 servers
Improvements in This Version

<table>
<thead>
<tr>
<th>Old Protocol</th>
<th>New Protocol</th>
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<tbody>
<tr>
<td>20M + 12N + 12a</td>
<td>13M + 0N + 2Na</td>
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M = Number of Clients  
N = Number of Servers  
a = Messages across

- Optimized implementation complete
- Much better scalability
- Example Services
  - Data Storage
  - Metadata
- Time spent executing transaction protocol is negligible