**H-STORE**
A High-Performance, Distributed Main Memory Transaction Processing System

**Overview**
- Many OLTP databases have common properties:
  - Repetitive execution of short-lived transactions.
  - Entire database fits in main memory of a cluster.
  - Data naturally partitions on keys (e.g., customer ids, warehouse ids)
  - Individual transaction invocations only touch a small subset of data.
- The development of H-Store facilitates research into exploiting these non-trivial aspects of OLTP systems.
- Previous main-memory databases have focused on the migration of legacy features from disk-based environments.

**System Design**
- H-Store is a new clean-slate design:
  - Main-memory row storage.
  - Designed for multi-core machines.
  - One execution thread per database partition.
  - Applications invoke pre-defined stored procedures consisting of structured control code intermixed with parameterized SQL commands.
- Replication provides data durability:
  - Local replication for quick fail over.
  - Remote replication for disaster recovery.

**Not Just Another Main Memory RDBMS**
- Uses data partitioning to distribute execution on shared-nothing, multi-core clusters.
- No disk-based logging or locking.
- Current prototype is 4x faster than a well-known commercial database.

**OLTP Transactions**
- H-Store's transaction protocol is optimized for fast single-sited transactions:
  - Such transactions are able to execute to completion without retrieving intermediate data from other nodes.
  - Serial execution eliminates the need for concurrency control mechanisms.
  - An automatic database designer will aid in the deploying databases with configuration that maximizes the number of single-sited transactions.
- Complex multi-site transactions are supported, but require more heavy-handed concurrency protocols.

**Performance**
- Our previous work shows that a specialized database engines can outperform “one-size fits all” systems:
  - A traditional row-storage RDBMS was shown to perform little useful work during OLTP workload experiments.
- H-Store TPC-C performance numbers:
  - Current Prototype: 4875 txn/s
  - Commercial Database: 1207 txn/s
  - Tested on a 2-core Intel Xeon E5320 @ 1.86 Ghz with 10 warehouses.