Definitions

- A TimesTen Instance is an installation
  - Not the same as an Oracle RDBMS instance
- Administrator
  - The user that installs the TimesTen software
  - Can be root or non-root
  - Responsible for managing users and privileges if access control is enabled
- Data Store: Equivalent to an RDBMS database
- Checkpoint File: The on-disk representation of a data store

What is TimesTen?

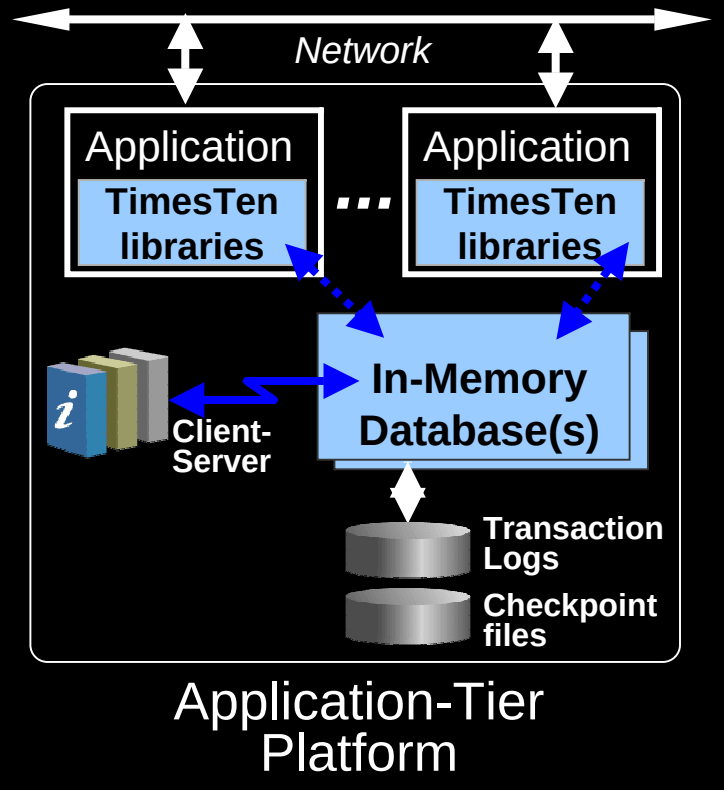
- In-Memory Database
  - SQL based relational engine
  - High performance
  - Event-processing
  - Real-time Capture, Storage, Use, and Distribution
  - Standalone or as a fast bidirectional cache
  - Preserves Transactional Integrity
- Memory-optimized application-tier database
- Response times measured in microseconds, not milliseconds
- Connection - direct (non-IPC) or client/server

Complementary Database Strengths

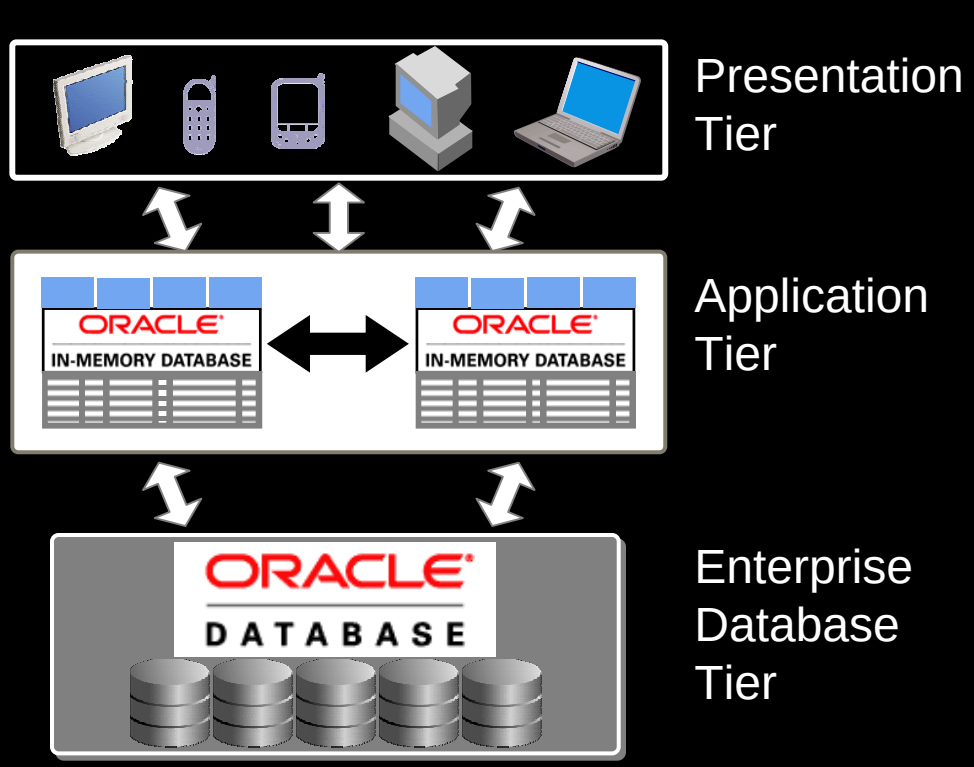
Characteristic	Oracle Database 10*g*	Oracle TimesTen
Data model	Relational: SQL	Relational: SQL
Target applications	Mission-critical	Mission-critical
Optimization	*Disk-centric*	*Memory-centric*
Typical deployment	*Database tier*	*Application tier*
Architecture	*Client/server*	*Direct data access*
Response times	*Milliseconds*	*Microseconds*
Data capacity	*Tens of terabytes*	*Tens of gigabytes*
Scalability	*Unlimited SMP/cluster*	*Good SMP*

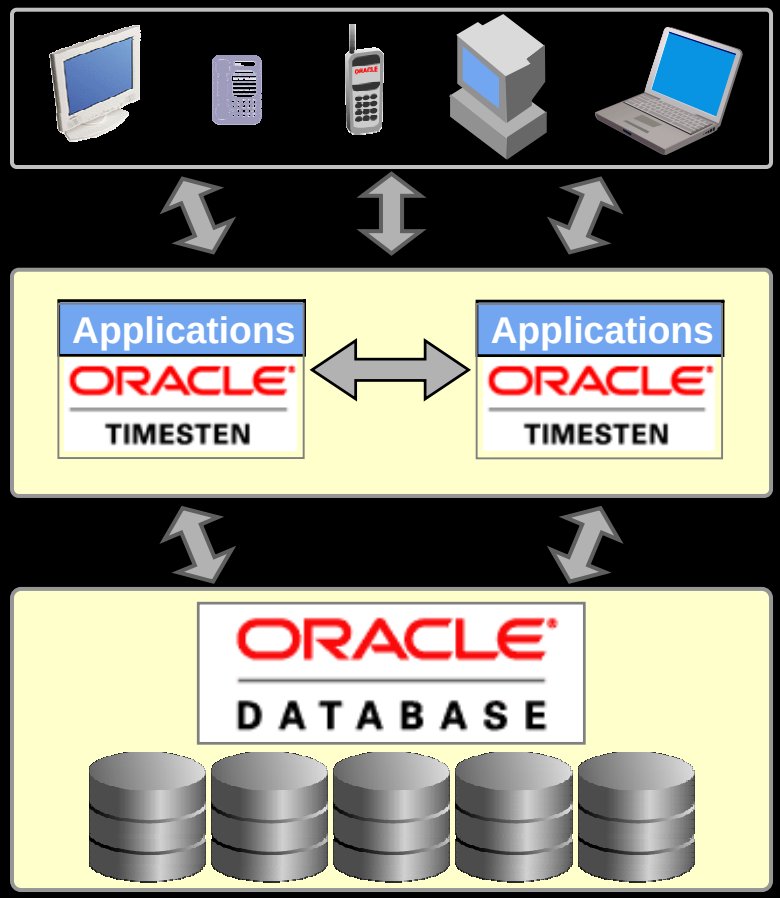
Optimized In-Memory Database

- Entire database stored in memory
- Optimized memory layout and algorithms
- Data store shared by multiple threads and processes
  - Embedded or client-server
- Standard APIs (ODBC, JDBC, SQL-92)
- Easy installation and configuration
- Near Zero Administration

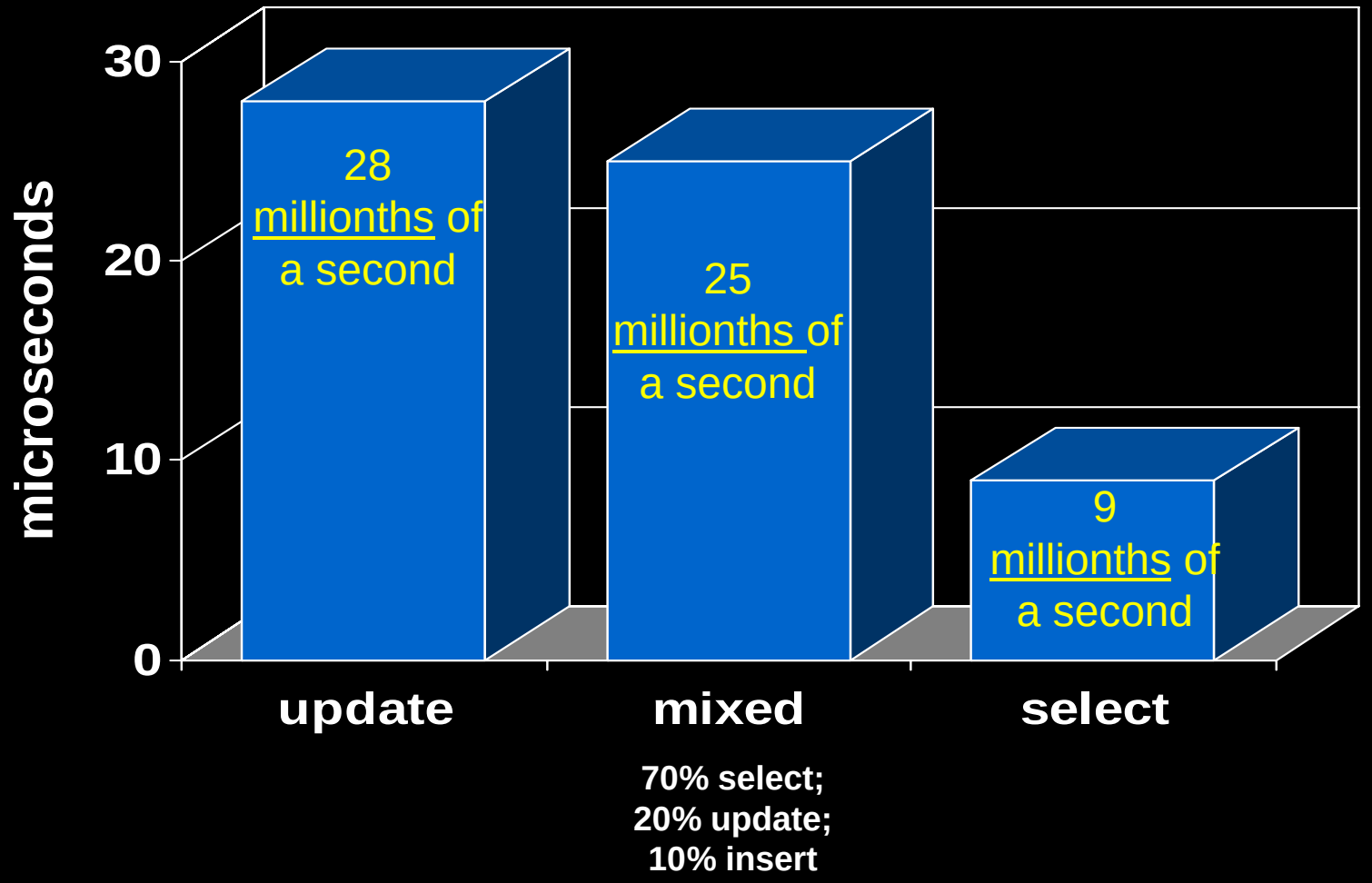


Topology Overview



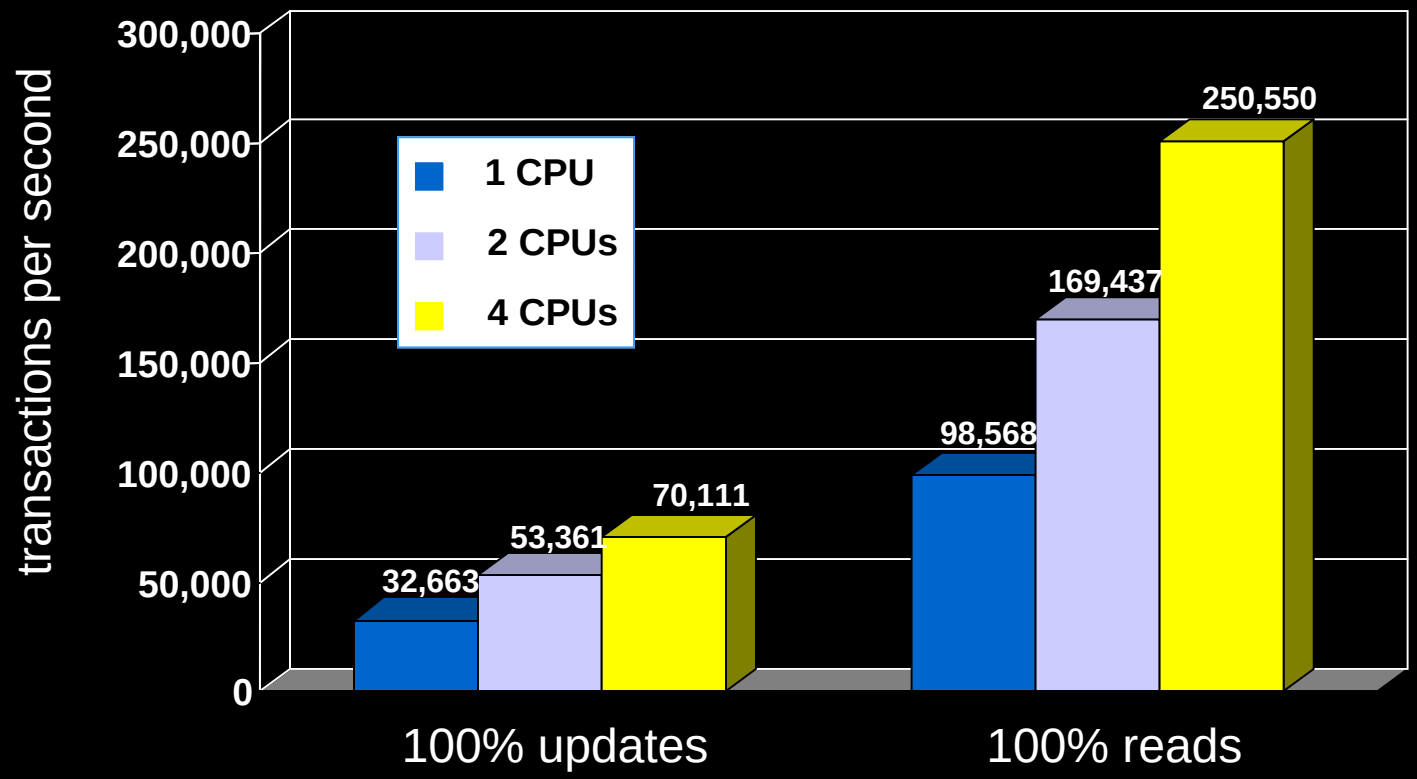


Lightening Fast Response



TimesTen In-Memory Database 6.0, 4-CPU, 3 GHz x86 Xeon, 32-bit RHLinux

Microseconds ... not milliseconds

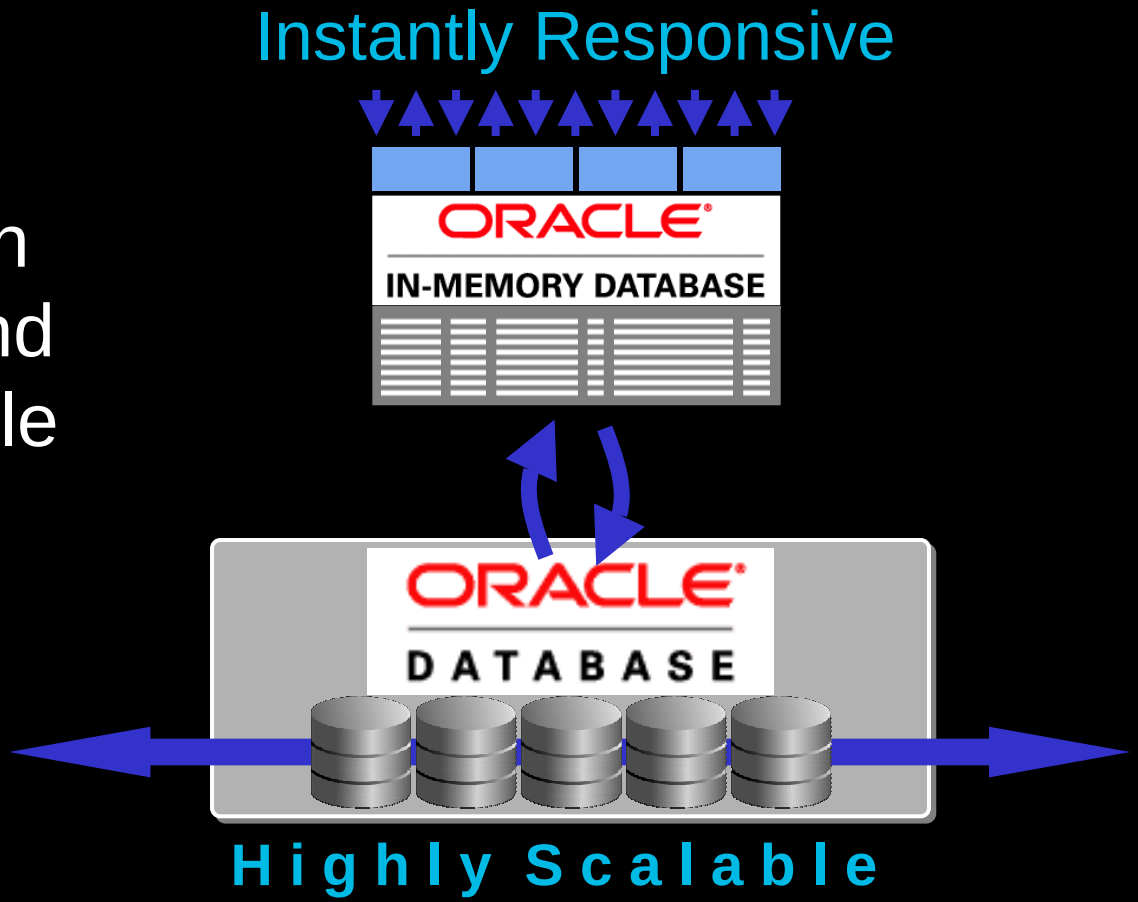


Why is TimesTen Faster?

- Conventional databases assume data primarily exists on disk
  - Optimization algorithms, buffer pool management, and index retrieval techniques are designed based on this fundamental assumption
- TimesTen designed with the knowledge that all data is in memory
  - Reduced codepath length
  - Simplified algorithms and structure
  - Reduced complexity
  - No buffer pool management
  - Smaller index pages
  - 1/10th the number of machine instructions required

Cache Connect to Oracle RDBMS

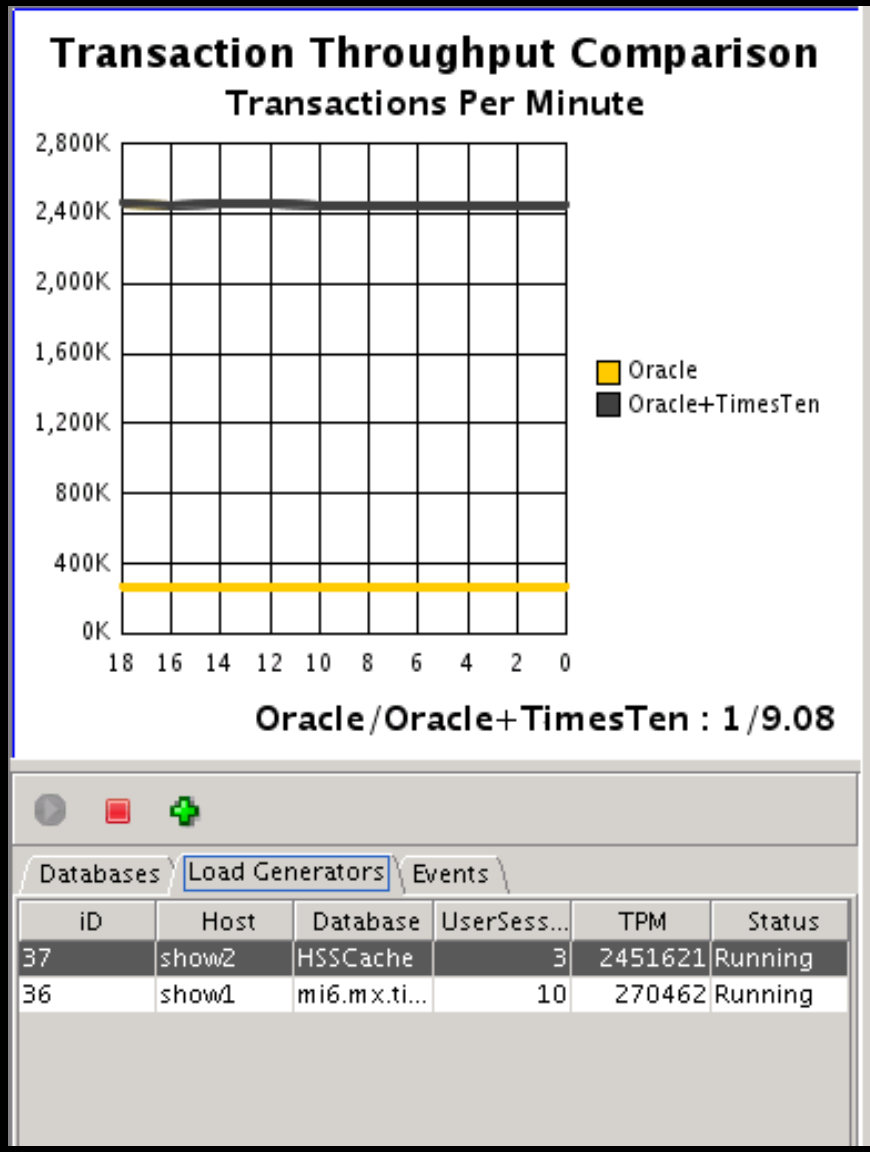
- Cache Connect to Oracle option combines the blazing-fast response times of TimesTen with the scalability and capacity of Oracle Database 10g and RAC

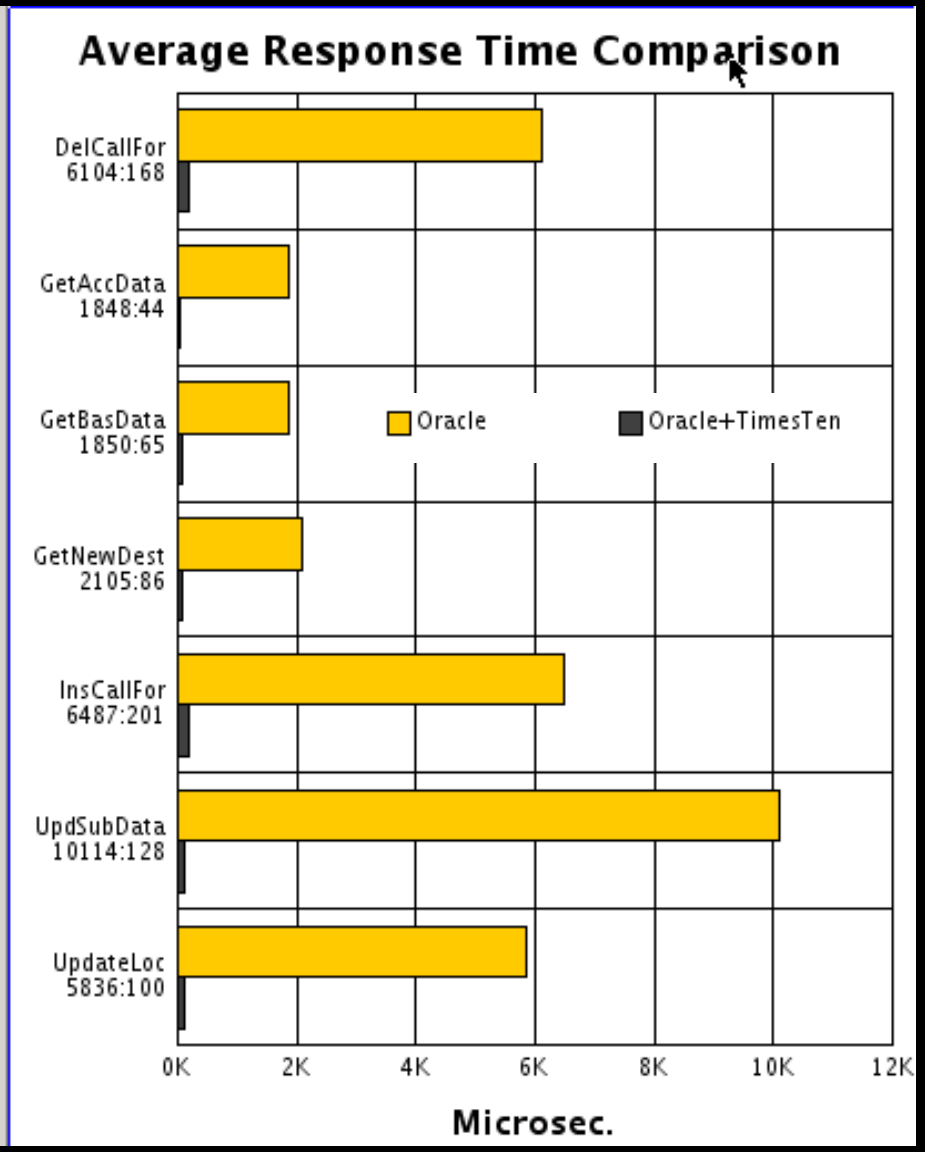


Persistent Storage

- When a data store is first opened the entire contents of the checkpoint file is read into memory
- Data store changes, from DDL operations are periodically and asynchronously written to the checkpoint file
- When a data store is closed all unwritten changes are written to the checkpoint file

Combined Performance





Why Is TimesTen So Fast?

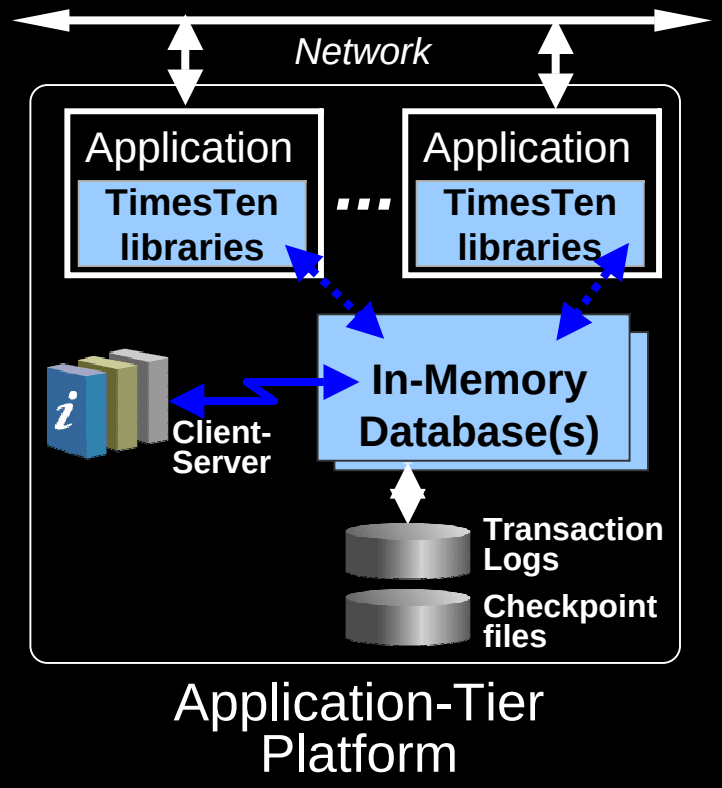
- TimesTen needs fewer CPU instructions to accomplish the same work as a disk RDBMS
  - Physical memory addresses are used inside the engine
  - No lookups of logical addresses to physical addresses
  - No buffer cache management overhead

Supported Platforms

Operating System	Processor Type
AIX 5L 5.2, 5.3 (32/64 bit)	IBM Power
HP-UX 11i (32/64 bit)	HP PA-RISC
HP-UX 11i v2 (64 bit)	Intel Itanium-2
MontaVista Linux CGE 3.0, 3.1 (32/64 bit)	Intel (IA32, EM64T)
Red Hat Enterprise Linux 3.0, 4.0 (32/64 bit)	Intel IA-32, EM64T, Itanium-2, AMD Opteron
Solaris 8, 9, 10 (32/64 bit)	UltraSparc & Opteron
SuSE Enterprise Server 9 (32/64 bit)	Intel IA-32 & EM64T, AMD Opteron
Tru64 Unix 5.1B (64 bit)	AlphaChip EV68
Windows Server 2000, 2003, XP	Intel IA-32

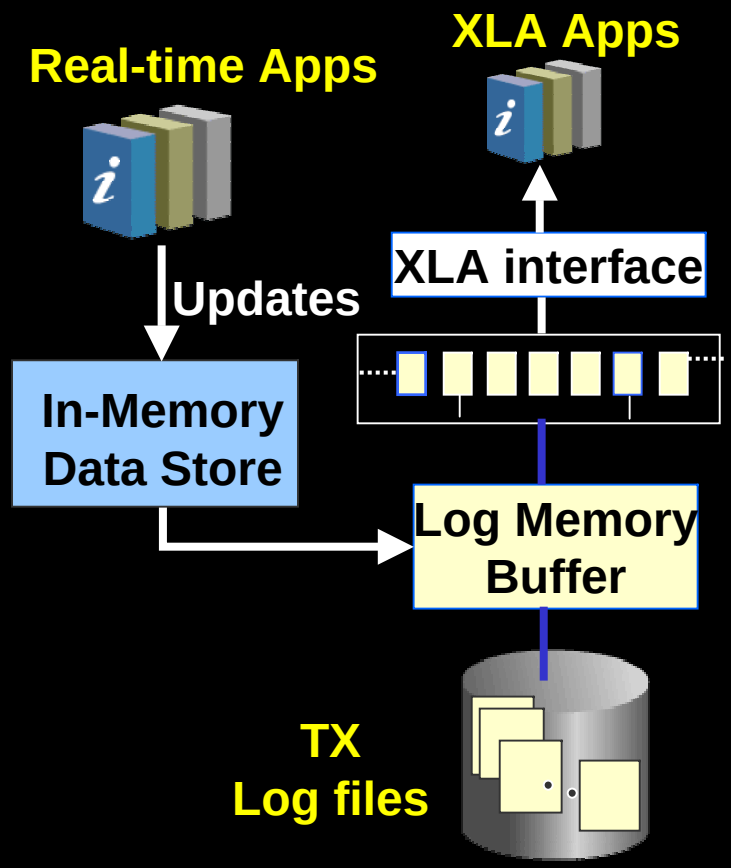
Logging and Data Persistence

- Buffered and synchronous transaction logging options
  - Application programs can control logging option at the transaction level
- Transaction logs and checkpoint files persist on disk
- Dual checkpoint files for recovery



Data Publishing - Transaction Log API (XLA)

- Transaction Log API (XLA)
  - Track real-time data changes
  - Monitor transaction updates
  - Propagate changes to external applications
  - Implement real-time event notification and processing



Value Proposition

- Exploit commodity hardware
- Lower maintenance costs
- Lower down-time costs
- Buy fewer Enterprise Edition Licenses
- Buy fewer RAC licenses

TimesTen Savings

Storage Option	EE	RAC	TimesTen	Total
List $/CPU	40,000	20,000	40,000	
# of Licenses	**16**	**16**		
Cost	**640,000**	**320,000**		**960,000**
# of Licenses	**6**	**6**	**4**	
Cost	**240,000**	**120,000**	**160,000**	**520,000**
Savings	**$300,000**	**$200,000**	**- 160,000**	**$440,000**