

# ORACLE TIMESTEN<sup>®</sup> IN-MEMORY DATABASE

## OVERVIEW

### ORACLE<sup>®</sup> TIMESTEN

- Real-time performance
- Multi-user concurrency
- Durability and Persistence
- Supports SQL via ODBC and JDBC
- Near-zero administration
- Flexible deployment options
- TimesTen to TimesTen Replication for HA, DR and Online Upgrades
- Systems monitoring via SNMP and Oracle Enterprise Manager

*Oracle TimesTen In-Memory Database is a memory-optimized relational database that empowers applications with the instant responsiveness and very high throughput required by today's real-time applications. Deployed in the application tier, Oracle TimesTen In-Memory Database operates on databases that fit entirely in physical memory using standard SQL interfaces. High availability for the in-memory database is provided through real-time transactional replication.*

### Real-Time Performance

Oracle TimesTen In-Memory Database delivers real-time performance by changing the assumptions around where data resides at runtime. By managing data in memory, and optimizing data structures and access algorithms accordingly, database operations execute with maximum efficiency, achieving dramatic gains in responsiveness and throughput, even compared to a fully cached disk-based RDBMS. Oracle TimesTen In-Memory Database is designed as an embeddable database within the applications to further improve performance of database operations by eliminating inter-process communication and unnecessary network operations.

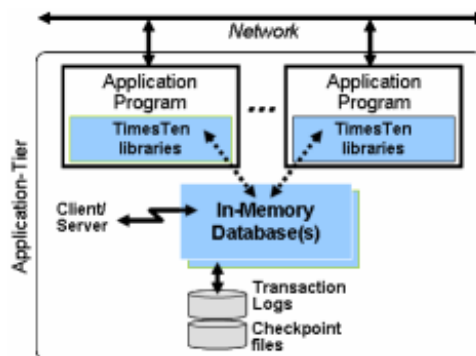


Figure 1. Oracle TimesTen In-Memory Database

Real-time data management has two performance dimensions – response time and throughput. With Oracle TimesTen In-Memory Database, a transaction that reads a database record can take less than 5 microseconds (a microsecond is one millionth of a second), and transactions that update or insert a record can take less than 15 microseconds (measured on Red Hat Linux running AMD Opteron 1.8Ghz processor). Consequently, throughput is measured in tens to hundreds of thousands of transactions per second, using commodity hardware.

#### FLEXIBLE REPLICATION:

- Active Standby
- Active Standby with Read-only Subscribers
- Active-Active
- Asynchronous and synchronous replication
- Uses streaming TCP/IP for optimized LAN and WAN support

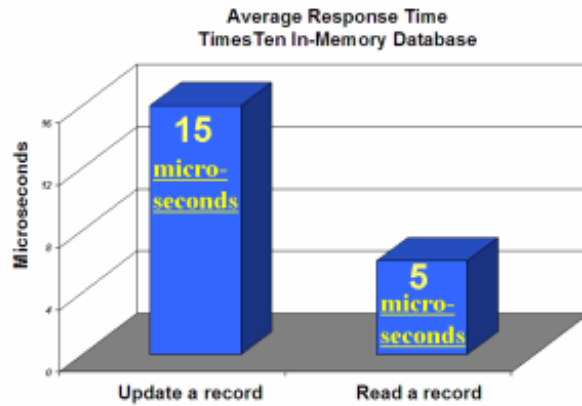


Figure 2. TimesTen In-Memory Database Average Response Times

#### Multi-User Concurrency, Persistence and Durability

Oracle TimesTen In-Memory Database is commonly deployed with multi-user and multi-threaded applications using row-level locking and committed-read isolation. While the best response time is achieved with the database embedded in the application, conventional client/server access is used for sharing the database for applications running on a number of servers.

Oracle TimesTen databases are persistent and recoverable. Durability is achieved through a combination of transaction logging and database checkpointing to disk.

#### High Availability

Availability is an essential requirement for most real-time applications. Industries that operate 24x7, such as telecommunications, and global systems that are Web-accessible, such as travel and reservations sites, cannot tolerate service downtime. Securities trading systems must remain continuously available while financial markets are open. The more real-time the system, the more likely it needs to be highly available.

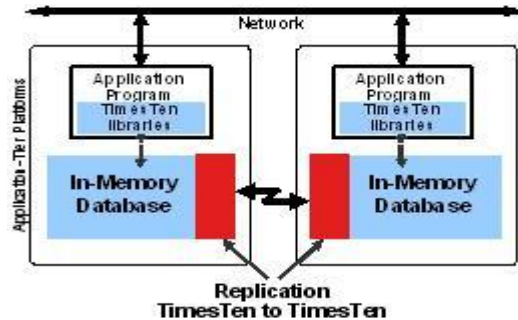


Figure 3. TimesTen Replication

TimesTen Replication provides the following functionality for performance and consistency:

- Flexible architecture supporting a range of configuration options including active-standby, active-standby pair with read-only subscribers, and active-active configurations. Replication is available over LAN and WAN connections.

REAL-TIME DATA  
MANAGEMENT FOR  
PERFORMANCE-CRITICAL  
APPLICATIONS:

- Telecom and networking
- Capital markets
- Defense and intelligence
- Call Center applications
- Travel and reservations
- Service-Oriented Architectures (SOA)
- Self-service portals

RELATED PRODUCTS AND  
SERVICES:

Oracle In-Memory Database  
Cache (Oracle Database  
Option)

- Transaction-log based replication scheme enables high efficiency and low overhead. The replication agent on the master database reads the records from its transaction log and forwards any relevant changes to the agent on the subscriber database, which then applies the updates to its local database. If the subscriber agent is not running, the master retains updates in its log files until they can be applied at the subscriber.
- Asynchronous replication provides maximum performance, and the application is completely decoupled from the receipt process of the replicated elements on the subscriber.
- Synchronous replication provides higher level of confidence for data consistency between the master and subscriber databases, and the application is blocked until replication confirms that the update has been both received and committed on the subscriber.
- Online upgrade allows individual server to be taken offline for software upgrades, while other servers continue uninterrupted. When the offline server rejoins the configuration, replication automatically applies the changes needed to bring the server current, and then resumes the normal replication process. Replication between servers running different TimesTen release versions is supported.

### Oracle In-Memory Database Cache

For applications with existing data already residing in an Oracle database, caching a performance-critical subset of the data into the TimesTen In-Memory Database is a practical solution to improve application transaction response time. The **Oracle In-Memory Database Cache** is an Oracle Database product option that enables the application to cache a subset of tables or table fragments from the Oracle database into in-memory database cache tables. The table fragments are described through an extended SQL syntax. Cache tables can be specified as read only or updatable. Applications read and update the cache tables using standard SQL. Cache table hierarchy for related tables with foreign key constraints is maintained for data consistency. Automatic data synchronization between the cache and the Oracle database is provided. Refer to the Oracle In-Memory Database Cache datasheet for details.

For additional technical information about Oracle TimesTen In-Memory Database, visit <http://www.oracle.com/technology/products/timesten>

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