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Comparing and Contrasting Oracles In-Memory Technologies

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www.oracle.com/uk/products/in-memory

Program Agenda

- 1 Overview
- 2 Oracle TimesTen
- 3 Oracle Database In-Memory Option
- 4 Customers

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Overview



Overview



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Oracle TimesTen History

- Founded in HP Labs in 1995
- Spun off into a separate startup in 1996
- Released in 1998 as the first commercial In-Memory RDBMS
- Acquired by Oracle in 2005

Oracle TimesTen In-Memory Database

Microseconds Response Time in Application Tier

- Relational Database

- Pure in-memory
- ACID compliant
- Standard SQL
- Entire database in DRAM



- Persistent and Recoverable

- Database and Transaction logs persisted on disk and flash storage (local to TimesTen)

- Extremely Fast

- Shared library approach
- Microseconds response time
- Very high throughput

- Compatible with Oracle Database

- Data types, PL/SQL, OCI, ODP.NET, PHP, R
- Integrated with RAC, Data Guard, Enterprise Manager, SQL Developer, etc.

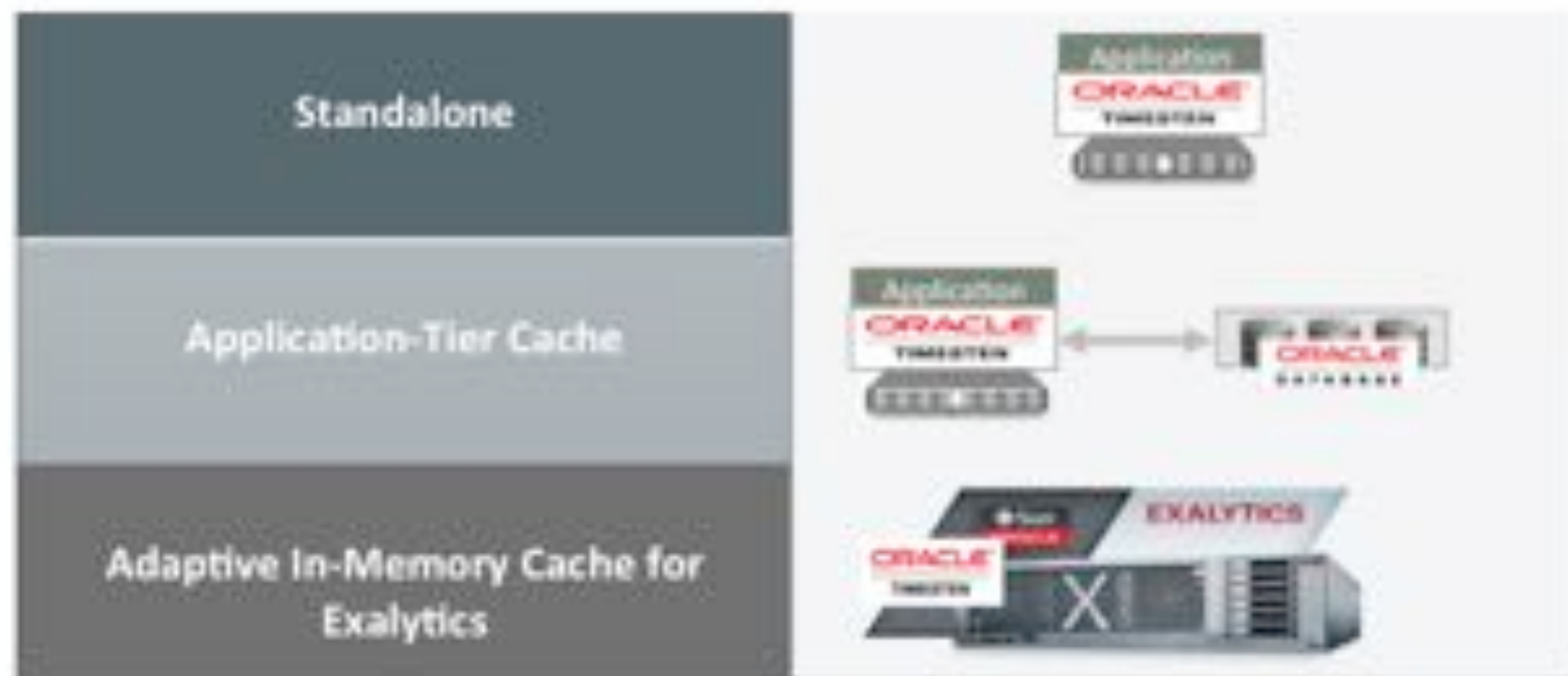
Real-Time Transactional Replication

High Availability and Disaster Recovery



- High performance
 - Synchronous / Asynchronous
 - Parallel send of log streams
 - Parallel apply of changes on Standby and Subscribers
- HA and DR support
- Online upgrades
 - No downtime
 - Cross-version replication
- Integration with Oracle Clusterware

Oracle TimesTen Deployment Mode



Program Agenda

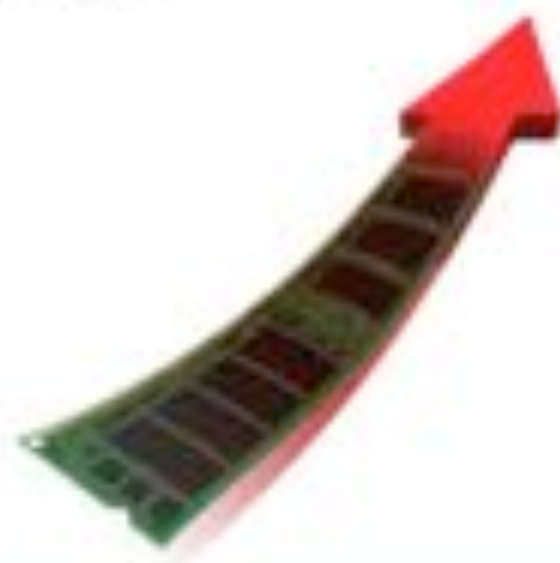
- ▶ Overview
- ▶ Oracle TimesTen
- ▶ Oracle Database In-Memory Option**
- ▶ Customers

Oracle Database In-Memory Option

- Released with latest Oracle Database version 12.1.0.2
- Cost option on top of Oracle Database Enterprise Edition
- Holds relational data entirely in memory
- Represents relational data in a columnar format

Oracle Database In-Memory Option Goals

- **100x** Faster Queries: Real-Time Analytics
 - Instantaneous Queries on OLTP Database or Data Warehouse
- **Transparent:** No application changes
 - Simple to Implement



Optimizing Transaction and Query Performance

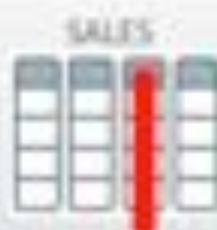
Row Format Databases versus Column Format Databases

Row



- Transactions run faster on row format
 - Insert or query a sales order
 - Fast processing few rows, many columns

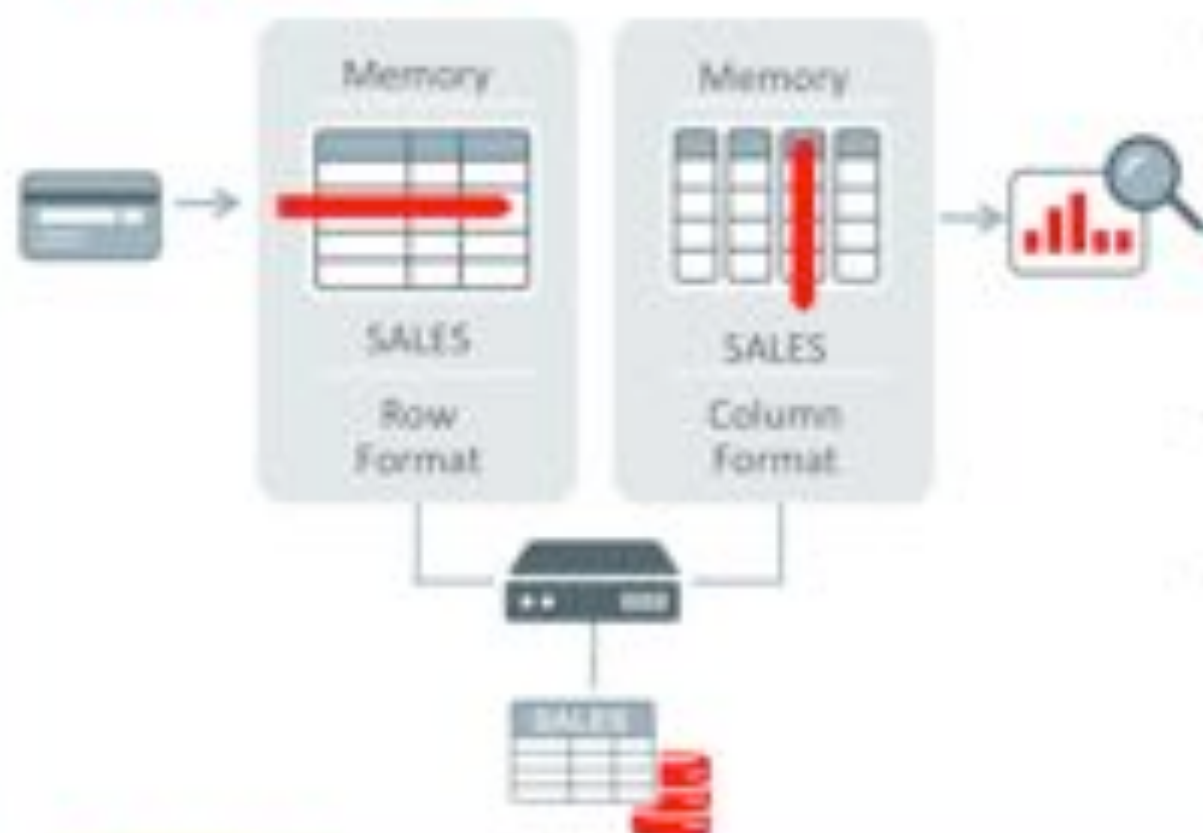
Column



- Analytics run faster on column format
 - Example : Report on sales totals by region
 - Fast accessing few columns, many rows

Until Now Must Choose One Format and Suffer Tradeoffs

Breakthrough: Dual Format In-Memory Database



- **BOTH** row and column in-memory formats for same table
- Simultaneously active and transactionally consistent
- Analytics & reporting use new in-memory Column format
- OLTP uses proven row format

Why is an In-Memory scan faster than the buffer cache?

IM Column Store

COL1	COL2	COL3	COL4
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X

Column Format

```
SELECT COL4 FROM MYTABLE;
```



RESULT

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Oracle TimesTen Customers



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<http://www.oracle.com/technetwork/timesten>

Top 5 reasons customers select TimesTen

Microsecond response time

Consistent response time

Handles workload peaks

Provides uninterrupted service

Requires minimal application changes

Oracle In-Memory Option Customers

Including beta testing customers



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www.oracle.com/technetwork/in-memory

Top 5 reasons customers select Oracle DB In-Memory Option

Speed up analytical queries

Real-Time analytics on transactional DB

Real-Time reporting

Speed up ETL processing

Storage saving by dropping indexes

Capabilities Matrix

	Coherence	TimesTen	DB in-Mem
Objects	Handles data internally in object format		
Relational Data		Handles data internally in a row format	Handles data internally in a columnar format
Parallel processing	process the data internally in parallel across the cluster	cannot run queries in parallel	allows you to run all your queries in parallel and divide up internally in sub-partitions
Ultra Low latency	Has memory & network bus in another node to connect the nodes	can be linked up as a shared library into the application itself, therefore providing low latency a network hop but also cannot connect to the OS	Requires at least 4 network NICs per server when running locally to be able to go up 427 G/s !!
Event driven	is designed for an event/message driven workload	is designed for an event/message driven workload	is designed for analytical queries but can still handle event/message driven workloads as well
Reporting driven	doesn't fit best choice for a BI workload	cannot run in parallel therefore analytical queries aren't best fit	is designed for analytical queries and BI workloads
Transactions	Does support transactions in a clustered mode	Does support transactions	Does support transactions
Query language	Provides SQL which is an abstract SQL engine	Provides a fully SQL SQL compliant query engine	Provides a fully SQL SQL compliant query engine
Joins	Doesn't support joins, can only be done programmatically in application code	allows you to join related data together	allows you to join related data together

Hardware and Software **Engineered to Work Together**

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