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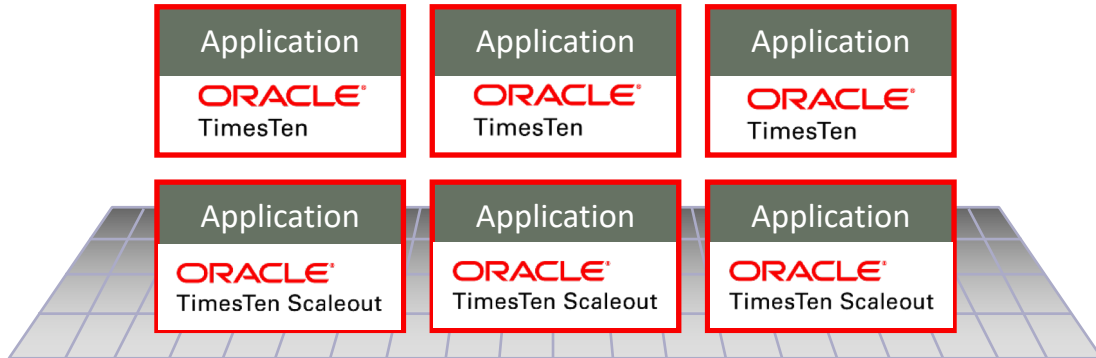
Oracle TimesTen In-Memory Database Overview

Presenter name

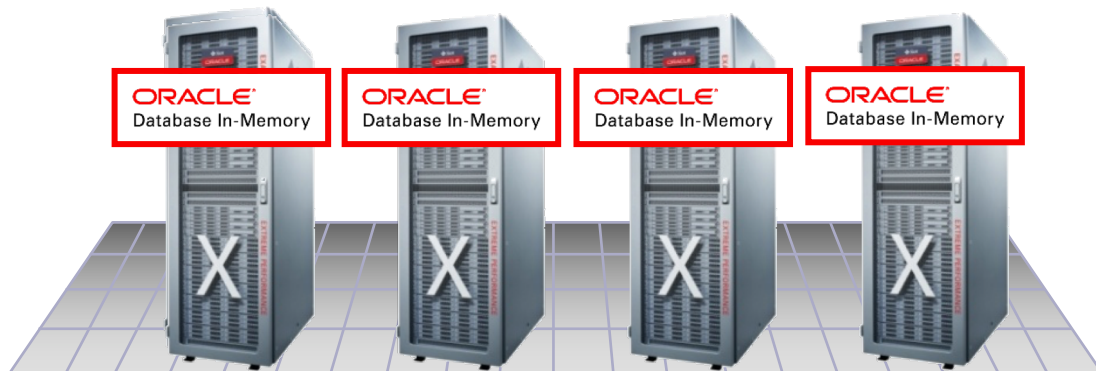
TimesTen Product Management

Best In-Memory Databases: For Both OLTP and Analytics

In-Memory for OLTP



In-Memory for Analytics



Oracle TimesTen In-Memory Database

- Lightweight, highly-available IMDB
- Primary use case: **Extreme OLTP**
- **Microsecond** response time
- **Millions of TPS** on commodity hardware

Oracle Database In-Memory Option

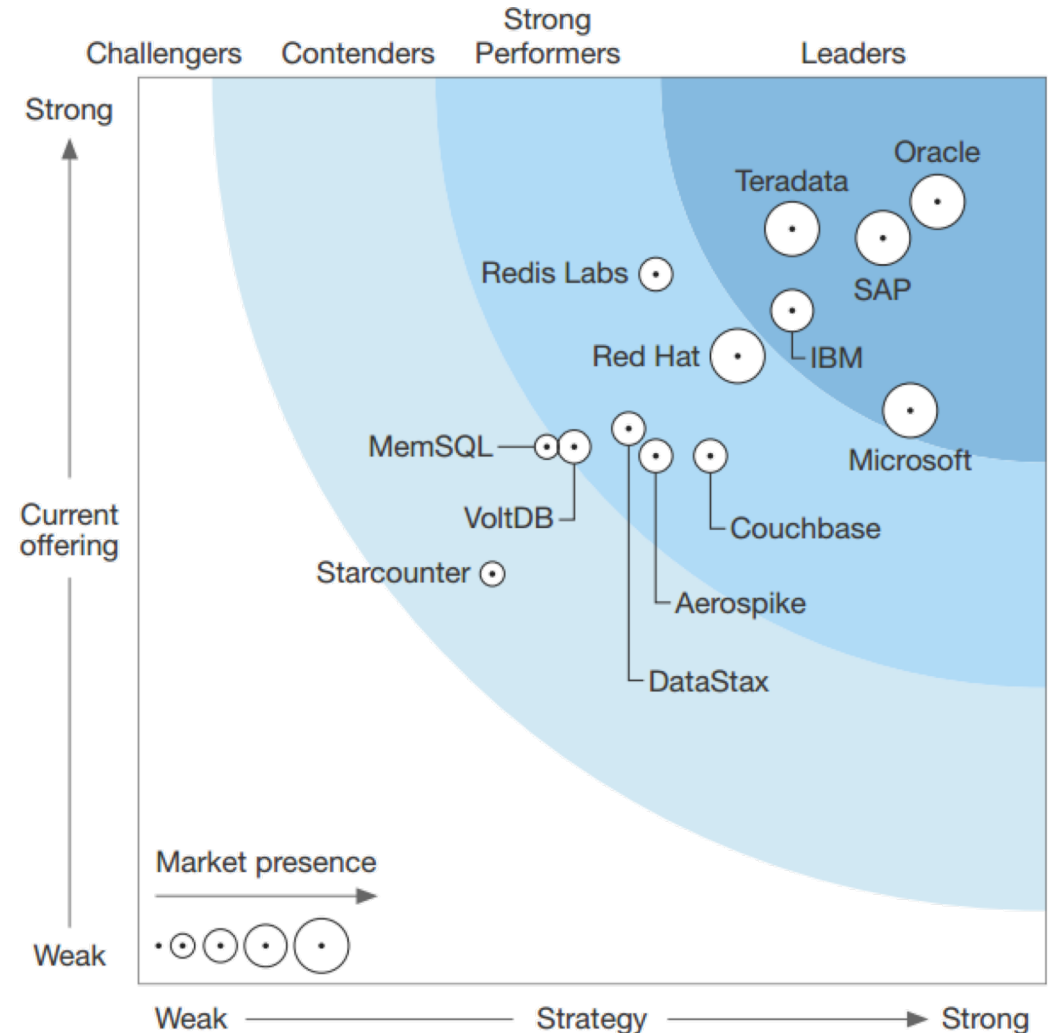
- **Dual-Format In-Memory Database**
- Primary use case: **Real Time Analytics**
- **Billions of Rows/Sec** scan rate
- Faster mixed-workload enterprise OLTP
 - Fewer indexes needed to support analytics

The Forrester Wave™: In-Memory Databases, Q1 2017

**Oracle In-Memory Databases
Scored Highest by Forrester
on both Current Offering
and Strategy**

<http://www.oracle.com/us/corporate/analystreports/forrester-imdb-wave-2017-3616348.pdf>

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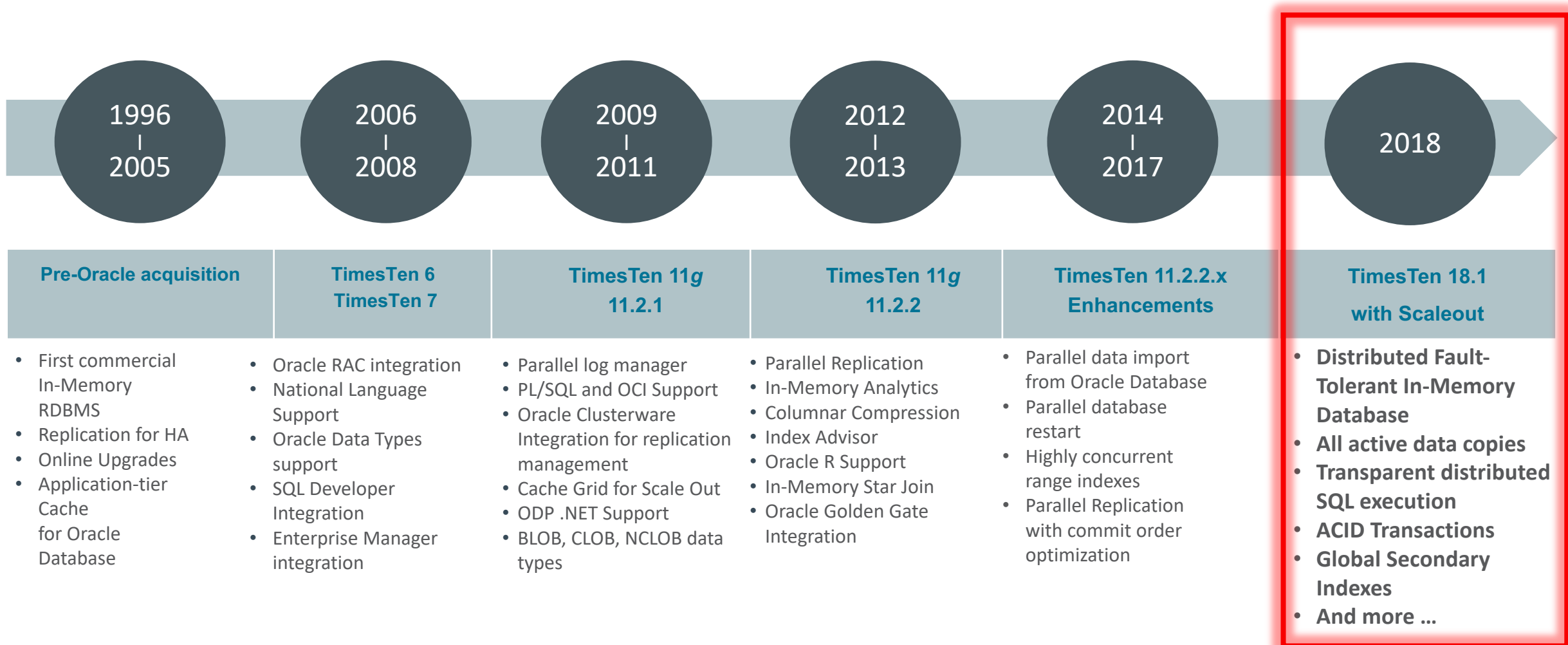
Agenda

- 1 Introduction
- 2 TimesTen Classic
- 3 TimesTen Application-Tier Database Cache
- 4 TimesTen Scaleout
- 5 Developing Applications for TimesTen
- 6 TimesTen in the Cloud
- 7 Licensing

Introduction

Oracle TimesTen – Class Leading In-Memory Database

20+ Years of Extreme Performance



Most Widely Used Relational In-Memory Database

Deployed by thousands of Companies



Oracle TimesTen In-Memory Database

Multiple Deployment Options

TimesTen Classic

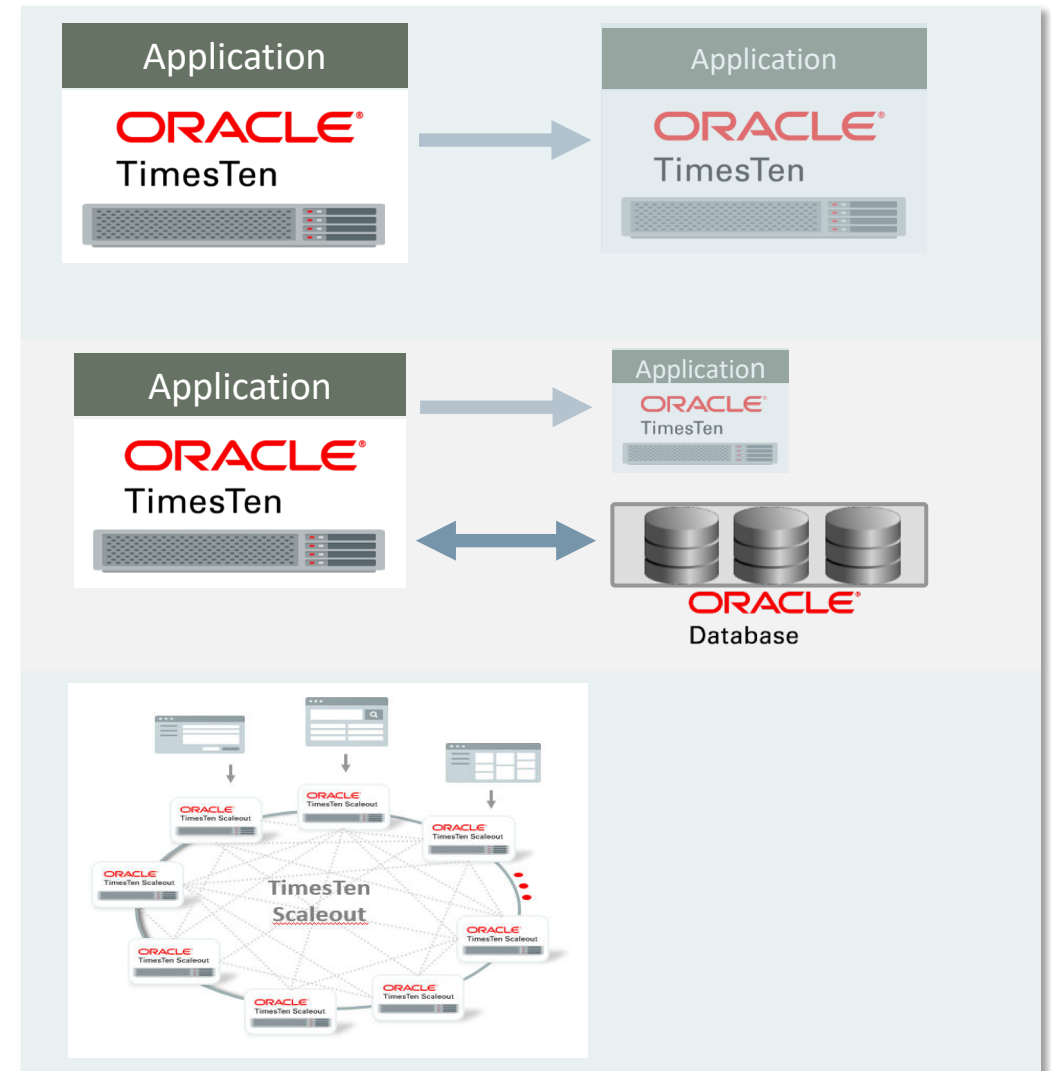
1. Standalone / Replicated Relational IMDB
 - Low latency applications
 - ISV/OEM Embedded solutions
2. Cache for Oracle Database
 - Accelerate Oracle Database OLTP applications
 - HA option via Replication

Microsecond response time, millions of TPS throughput

TimesTen Scaleout – ***new in 18.1***

3. Distributed Relational IMDB
 - High throughput and storage capacity
 - Transparent data distribution
 - Elastic scalability
 - Fault tolerant

Hundreds of millions of TPS throughput



TimesTen Classic

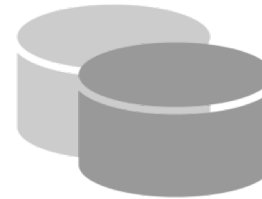
TimesTen Classic

Relational Database



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

Persistent and Recoverable



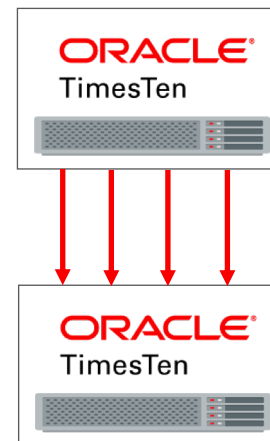
- Database and Transaction logs persisted on local disk or flash storage
- Automatic recovery after failure

Extremely Fast



- Microseconds response time
- Very high throughput

Highly Available

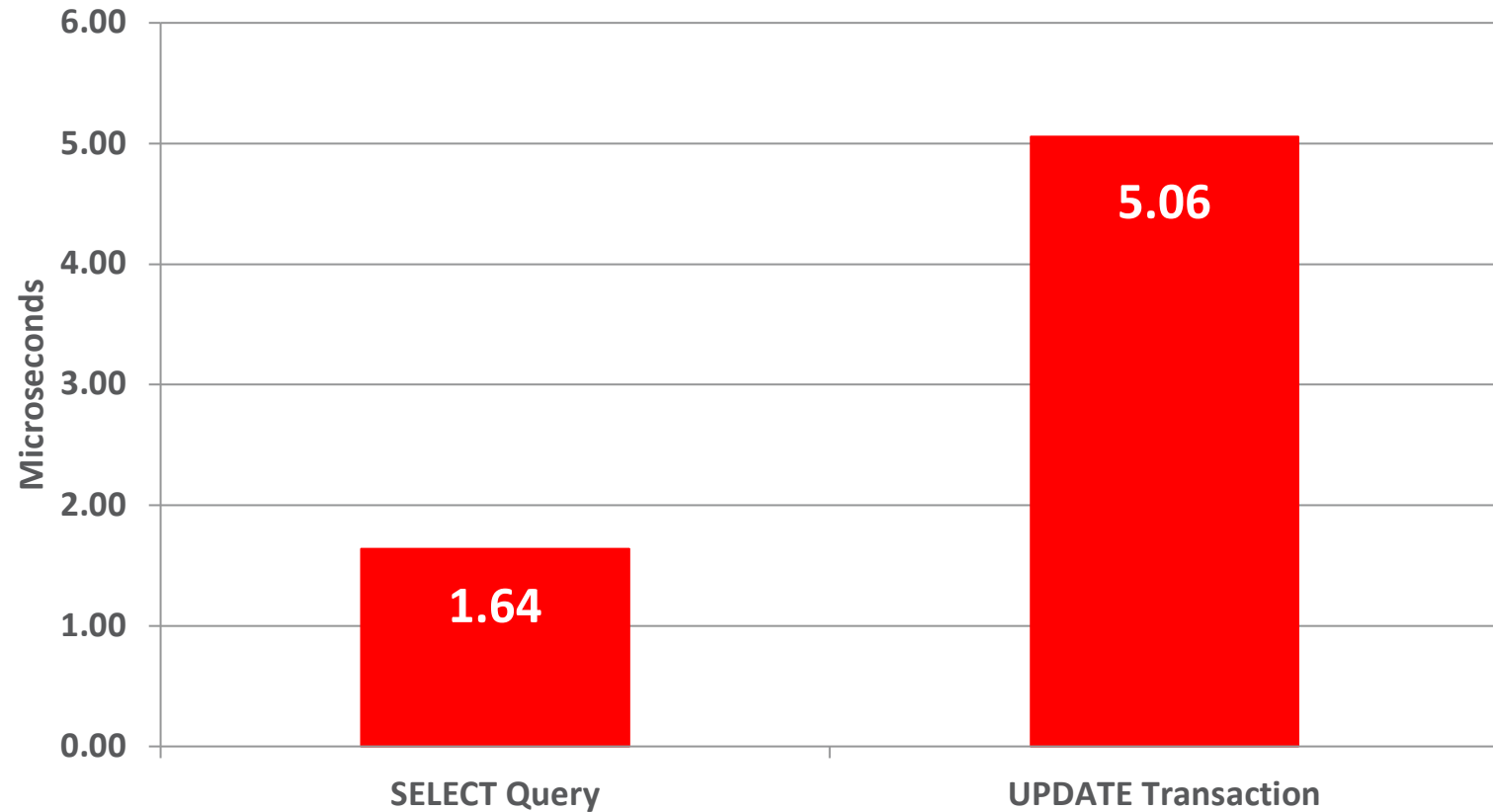


- Active-Standby and multi-master replication
- Very high performance parallel replication
- HA and Disaster Recovery

Performance – Response Time

Low Latency - Microseconds Response Time

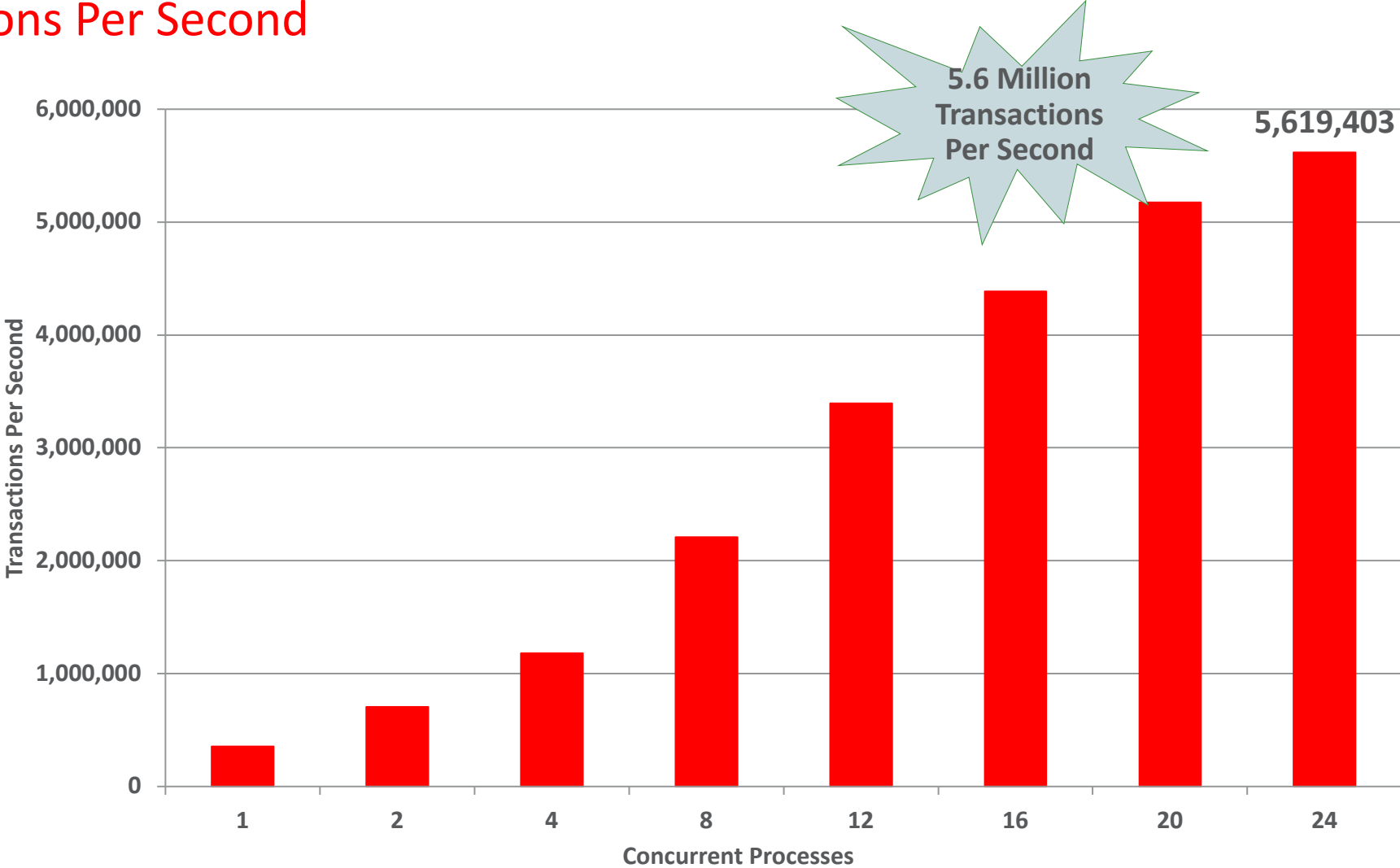
TPTBM Read and Update
E5-2699 v4 @ 2.20GHz
2 socket, 22 cores/socket,
2 threads/core
TimesTen 11.2.2.8.0
(100M rows, 17GB data)



Performance - Throughput

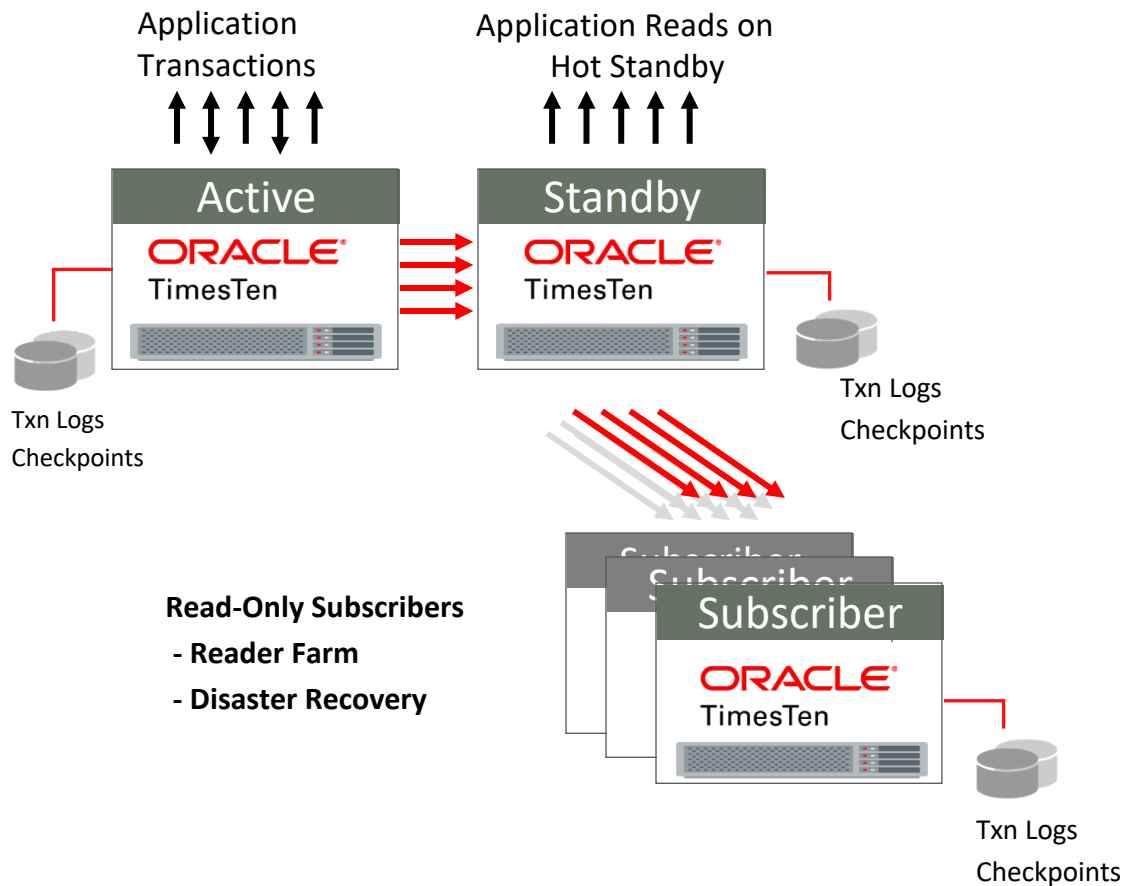
5.6 Million Transactions Per Second

TPTBM Mixed
Workload
(80%R-10%U-5%I-5%D)
E5-2699 v4 @ 2.20GHz
2 socket, 22
cores/socket,
2 threads/core
TimesTen 11.2.2.8.0
(100M rows, 17GB)



Real-Time Transactional Replication

High Availability and Disaster Recovery



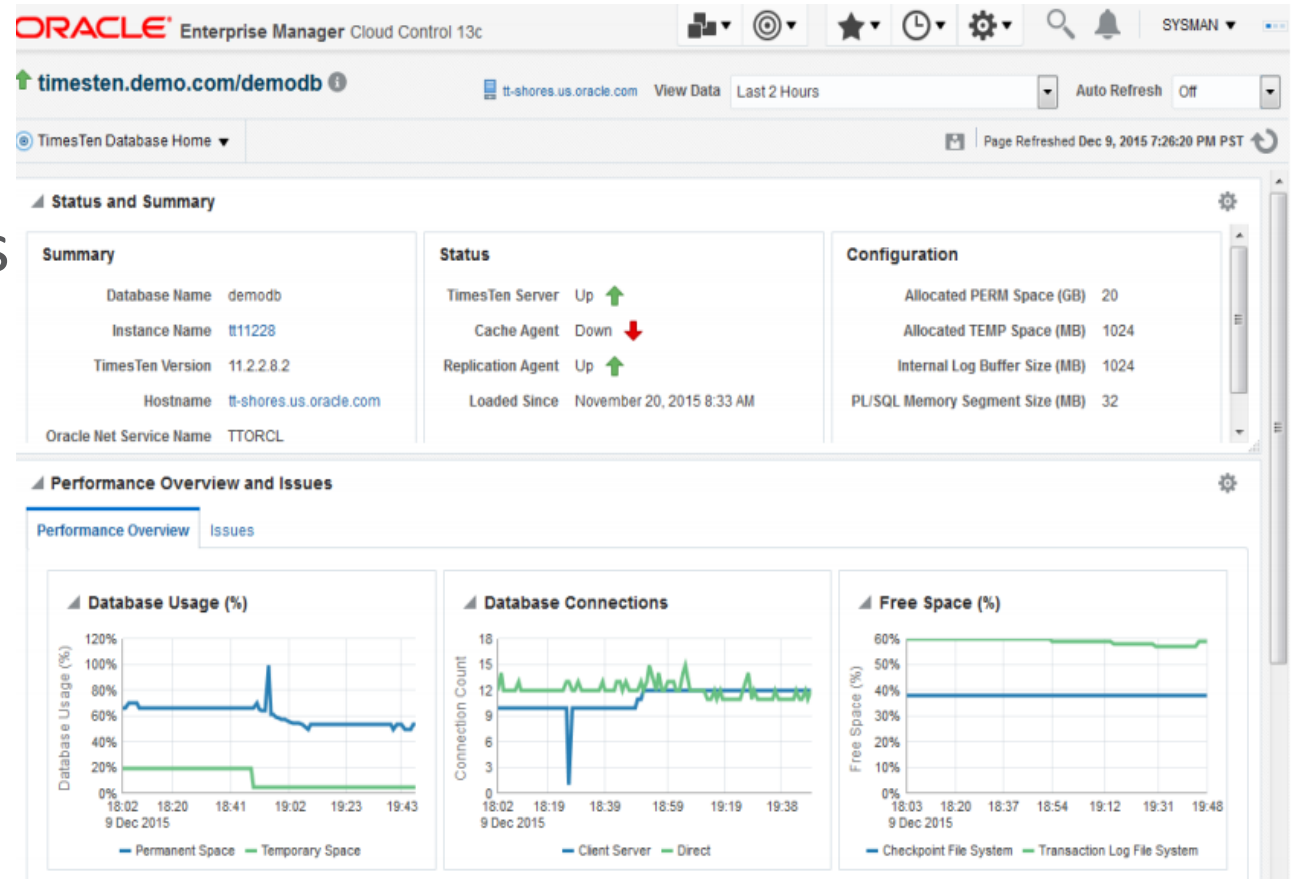
- High performance
 - Synchronous / Asynchronous
 - Parallel send of log streams
 - Parallel apply of changes on Standby and Subscribers
- HA and DR support
- Online rolling upgrades
 - No application downtime
 - Cross-version replication
- Integration with Oracle Clusterware

Enterprise Manager for TimesTen

System Monitoring Plug-in

ORACLE®
ENTERPRISE MANAGER 13^c

- Real-time performance and availability monitoring
- TimesTen databases and instances administration
- Automate backups and restore
- Cache and Replication activity reporting
- SQL and Transaction monitoring



Ericsson Convergent Charging System (ECS)

Ericsson - Sweden & India



Application Overview

- Industry : Telecom
- Business : Subscriber Charging
- Application : Converged Charging Platform
 - ~1 billion subscribers worldwide across multiple operators
 - ~20% market share based on subscriber numbers
 - Real-time rating (price calculation, promotion and loyalty)
 - Real-time accounting (spending control, multi-account and units, historical usage)

Challenges

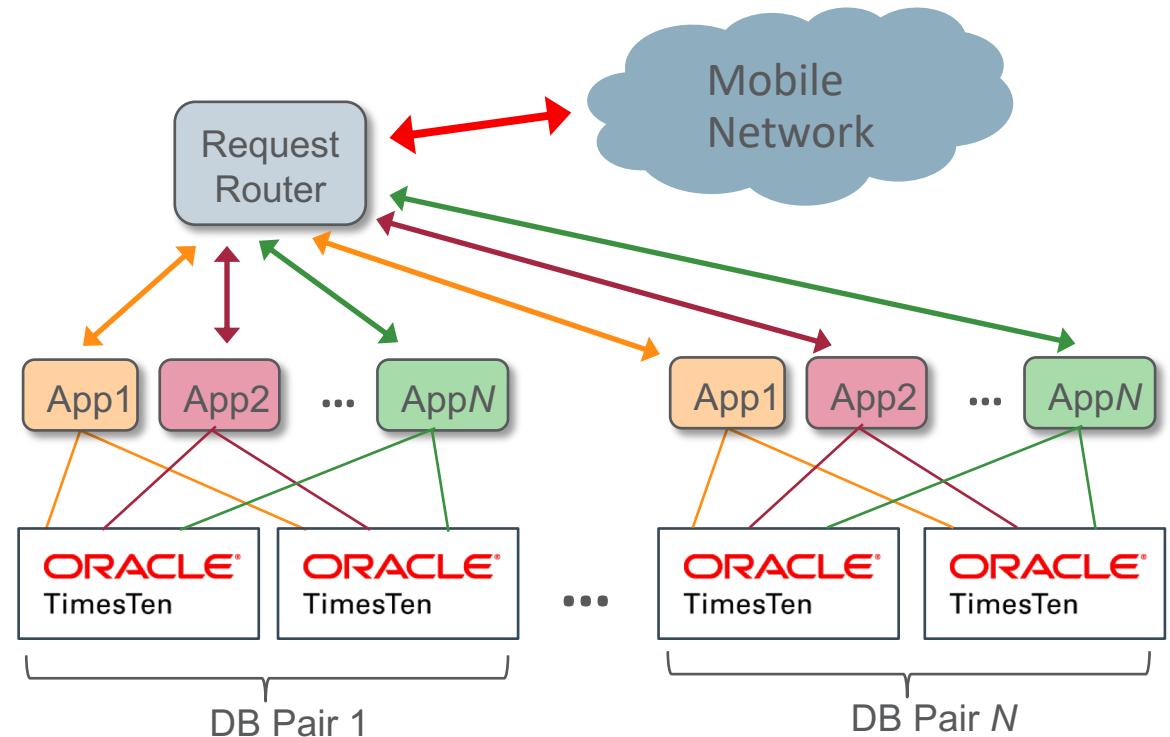
- Need low, consistent end to end response time
- Need 99.999% availability
- Need wide platform support
- Want SQL and transactions, standard APIs

Solution

- Oracle TimesTen Database
- Oracle TimesTen Replication for High Availability

Why TimesTen ?

- End-to-end response time <<100 milliseconds
- Easy to scale via custom sharded solution
- Robust and reliable
- Easy to use and to integrate



Mobile Positioning System (MPS)

Ericsson - Sweden & China



Application Overview

- Industry : Telecom
- Business : Business & Operation Support System
- Application : Mobile Positioning System
 - GMPC node of MPS collects and utilizes mobile subscribers' location information
 - MPS has 120+ installations distributed over Americas, Europe, Asia-Pacific and Africa

Challenges

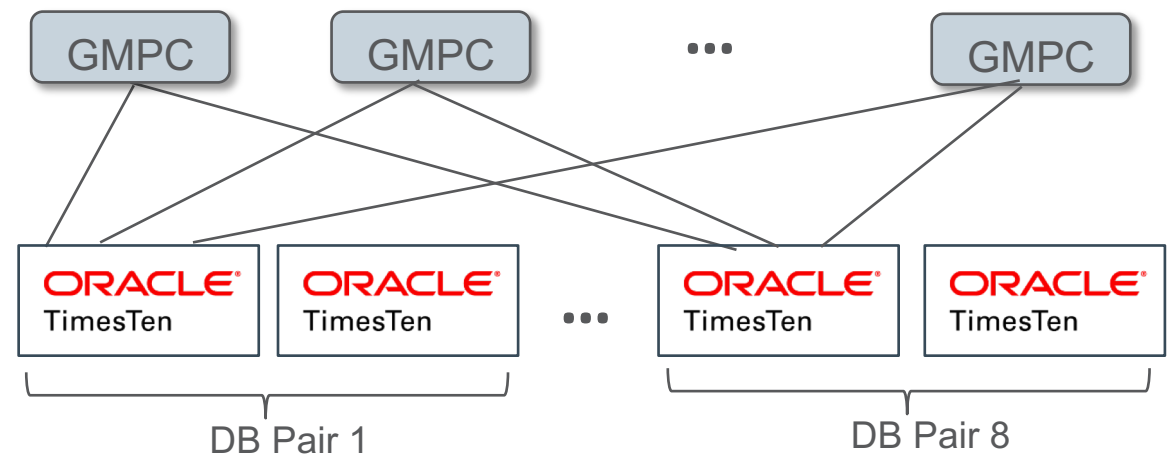
- Need highly concurrent mobile locations updated randomly
- Need high transaction throughput with consistent low latency
- Need 24x365 availability

Solution

- Oracle TimesTen Database
- Oracle TimesTen Replication for High Availability

Why TimesTen ?

- End-to-end response time ~1.5 milliseconds
- 63,000 transactions per second (replicated in real time) per database (shard)
- Multi-DB sharded architecture to achieve increased performance – about 250k transactions per second
 - Partition the data across multiple TimesTen active-standby database pairs
 - 8 database server pairs (shards)



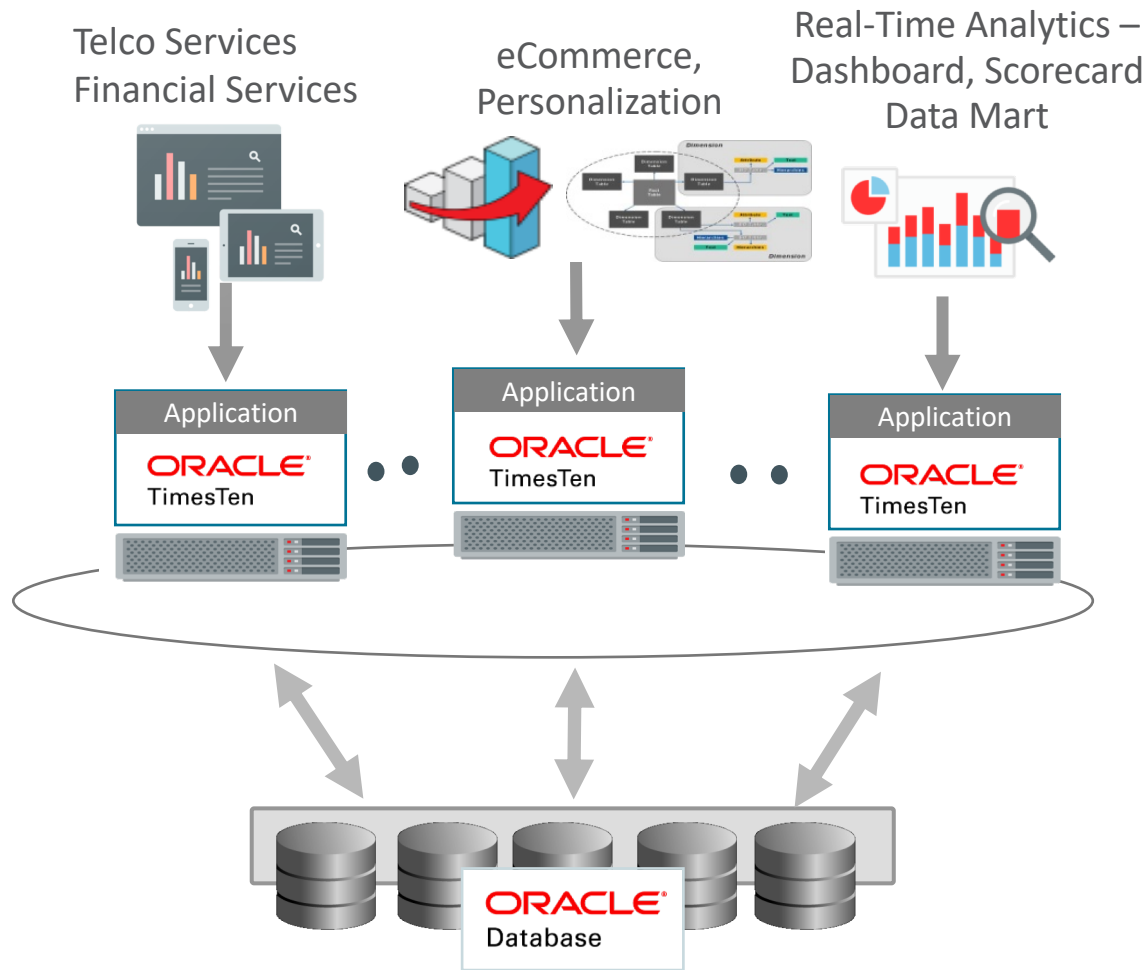
TimesTen Classic Summary

- Respond to real-time events
Response time measured in microseconds
- Provide consistent level of responsiveness
Fast and consistent response time with low latency
- Provide continuous, uninterrupted service
High availability and online upgrades
- Ability to leverage existing applications with minimal changes to application code and interfaces
Standard SQL, relational model, standard APIs
- Compatible with Oracle products
Oracle Enterprise Manager, SQL Developer, Oracle GoldenGate, Oracle Clusterware

TimesTen Application-Tier Database Cache

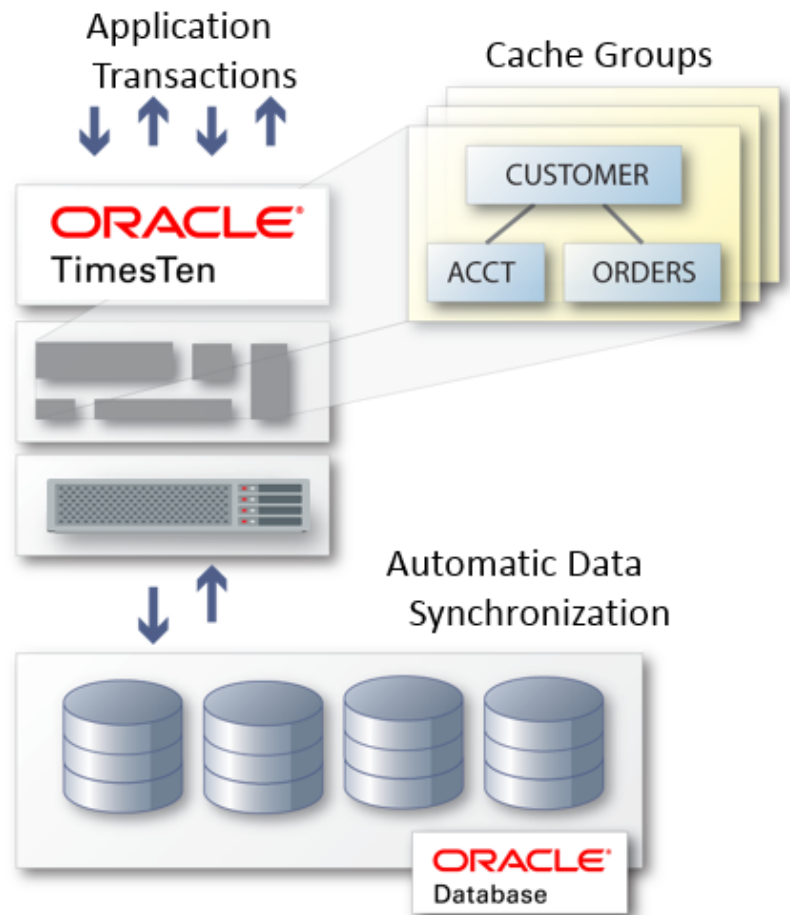
For Oracle Database Enterprise Edition

TimesTen Application-Tier Database Cache For Oracle Database



- Cache subset of Oracle Database tables in TimesTen for better response time
 - With full persistence to local storage
- Read-write caching
 - Transaction execution and persistence in TimesTen
- Read-only caching
 - Transactions executed in Oracle Database
- Same architecture as TimesTen Classic
 - Supports cache tables and native TimesTen tables
- HA and fault tolerance in the application-tier

Flexible Cache Group Configurations

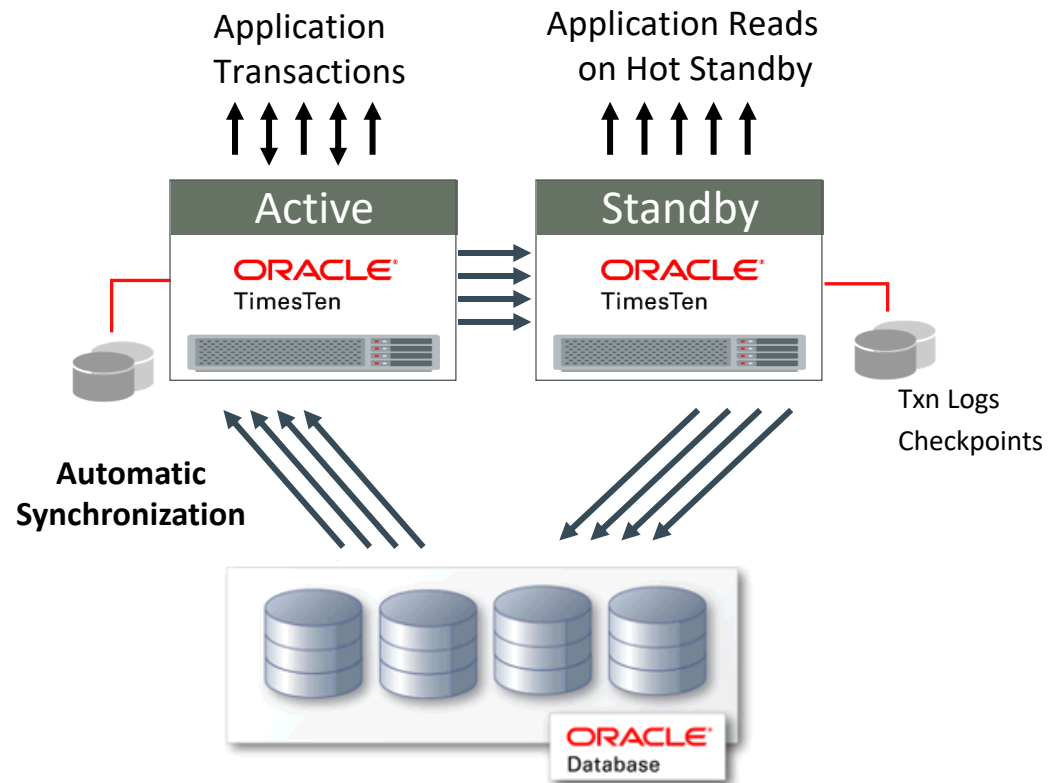


- Cache Group describes the Oracle Database tables to cache
 - All or subset of rows and columns
 - Defined using SQL

```
CREATE CACHE GROUP PremierUsers
FROM OE.CUSTOMER (
    NAME VARCHAR2(100) NOT NULL,
    ADDR VARCHAR2(100)
)
WHERE OE.CUSTOMER.ORDER > 500;
```
- Cache tables are regular tables in TimesTen
 - Joins/search, insert/update/delete

Read-write and Read-only Caching

High Availability - MAA



- Read-write caching
 - Parallel replication of transactions from Active to Standby
 - Parallel write-through of transactions to Oracle Database
- Read-only caching
 - Multi-stream refresh of transactions from Oracle Database
 - Parallel replication of refresh transactions to Standby
- Application continues even if Oracle Database connection is down

Real-Time Session and User Management

KDDI - Japan

Application Overview

- Industry : Telecommunications
- Business : Carrier and Service Provider
- Application: Real-Time Session and User Management
 - Track Sessions
 - Identify user profile from assigned IP address
 - Capture accounting information

Challenges/Requirements

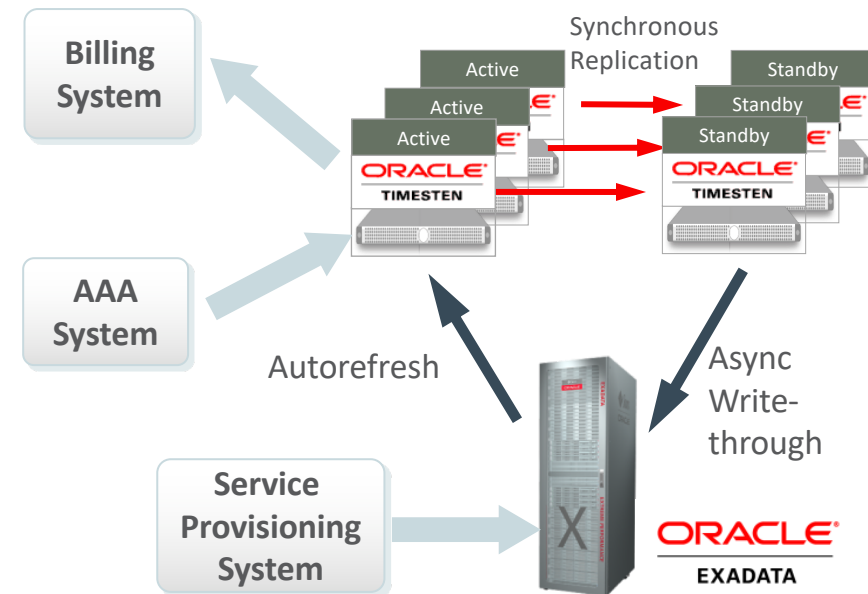
- Low, consistent latency (< 10 milliseconds)
- Transactions (4,500 Writes + 10,000 Reads) TPS
- Support minimum 50M users and 10M active sessions
- Mission Critical – 24x365 availability needed
- Zero data loss on any failure
- Data synchronization with Exadata

Solution

- Oracle TimesTen Application-Tier Database Cache
- TimesTen Replication for High Availability
- Oracle Exadata

Why TimesTen ?

- < 1 ms latency (10x improvement), 7,000 write TPS (1.5x), 35,000 read TPS (3.5x)
- Scalable architecture
- Zero data loss on any failure with synchronous replication
- Easy integration with Exadata



Phone Agent Task Assignments

Ping An Insurance - China

中国平安 PINGAN

Application Overview

- Industry : Finance
- Business : Insurance, Banking, Investment
- Application : Agent Task Management
 - Automatic task assignment based on predefined rules
 - Manually reassign task from one agent to another

Challenges

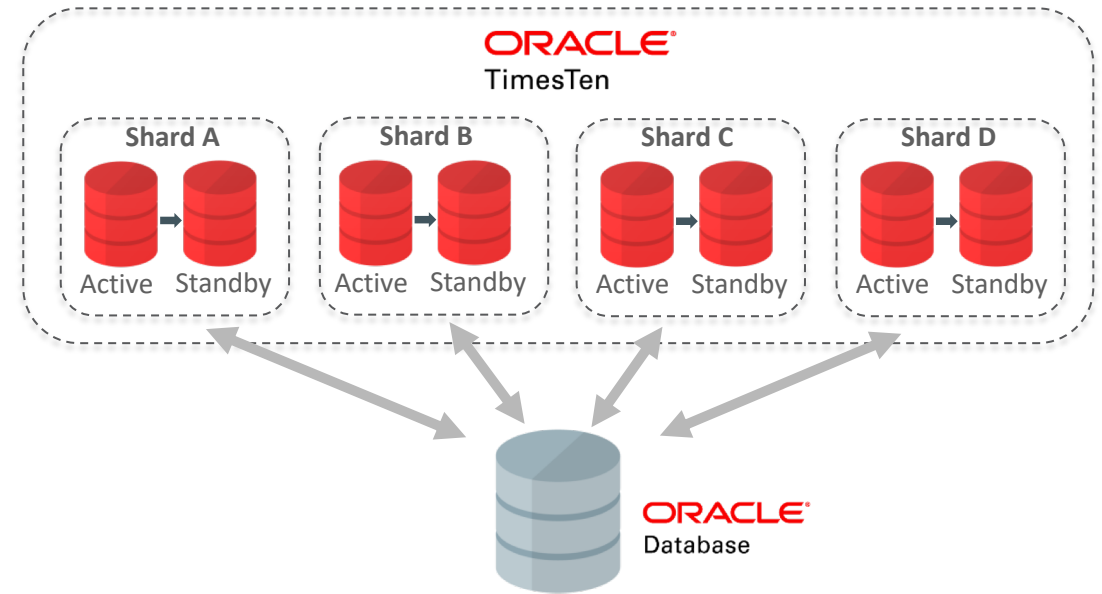
- Database scalability with extreme high concurrency affecting end to end response time
- Maintain user satisfaction
- Minimal changes to existing architecture and application
- Must be highly available

Solution

- Oracle TimesTen Application-Tier Database Cache
- TimesTen Replication for High Availability
- Oracle Database

Why TimesTen ?

- Delivered lower and consistent response time; achieved 40x improvement in both response time and throughput
- Automatic data synchronization between TimesTen and Oracle Database
- With built-in HA, supports automatic failover and switchover



TimesTen Cache Summary

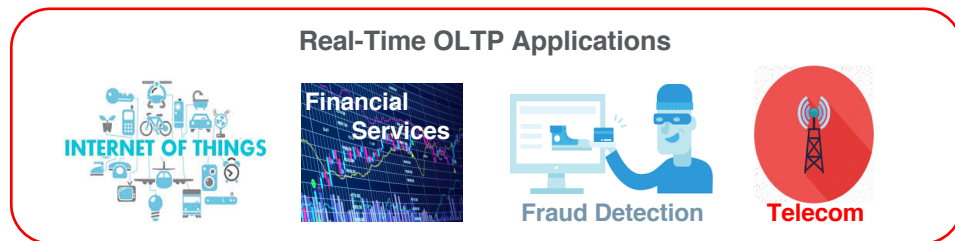
- Accelerating existing Oracle Database Applications
Caching from Oracle Database with automatic change synchronization
- Same architecture and features as TimesTen Classic
Low, consistent response time
High availability and online upgrades
Standard SQL, relational model and standard APIs
Compatible with Oracle Enterprise Manager, SQL Developer, GoldenGate and Clusterware
- Multiple configuration options – mix and match
Read-only cache groups
Write-through cache groups
Native TimesTen tables

TimesTen Scaleout – *new in 18.1*

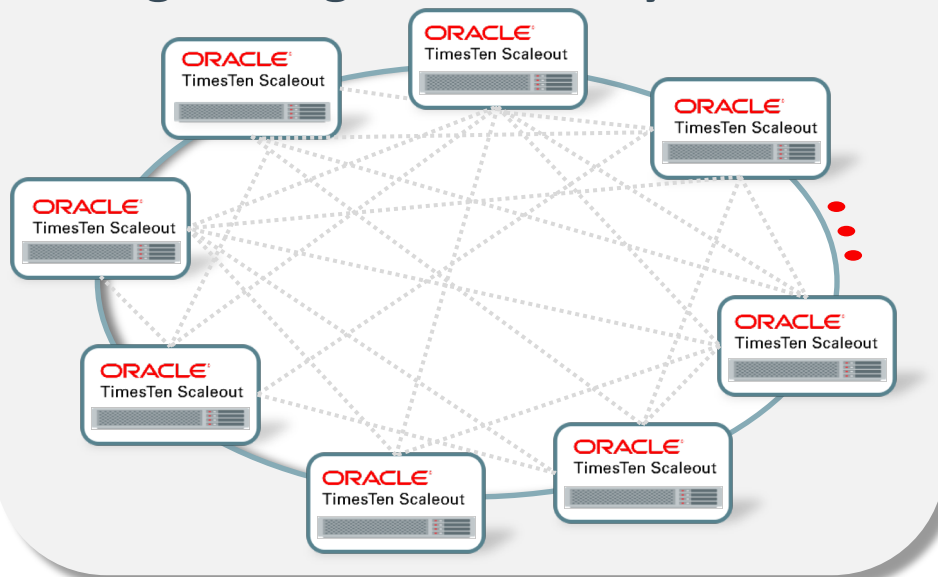
Distributed, Elastically Scalable, Single Image, Fault Tolerant

TimesTen Scaleout

Built on proven TimesTen technology



Single Image In-Memory Database

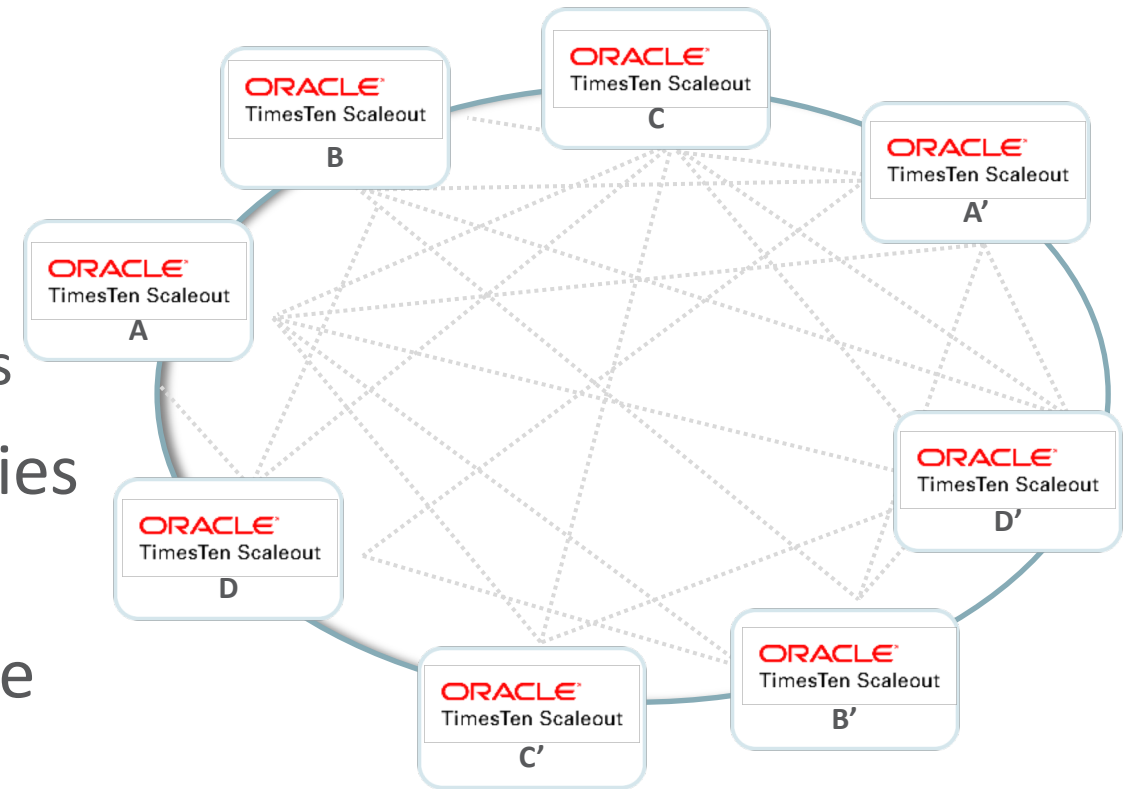


- For High-Velocity **Extreme OLTP** applications
 - IOT, trading, fraud detection, mobile, click stream, billing, orders, etc.
- Cutting-Edge Design:
 - Pure In-Memory, Full SQL, Full ACID Transactions
 - Scale-out shared nothing architecture
 - Multiple data copies for HA (K-safety)
 - All copies active for read/writes
 - Global secondary indexes
 - Complex SQL and Parallel SQL for reporting and batch
- Centralized management and administration

Distributed, Shared Nothing, In-Memory Database

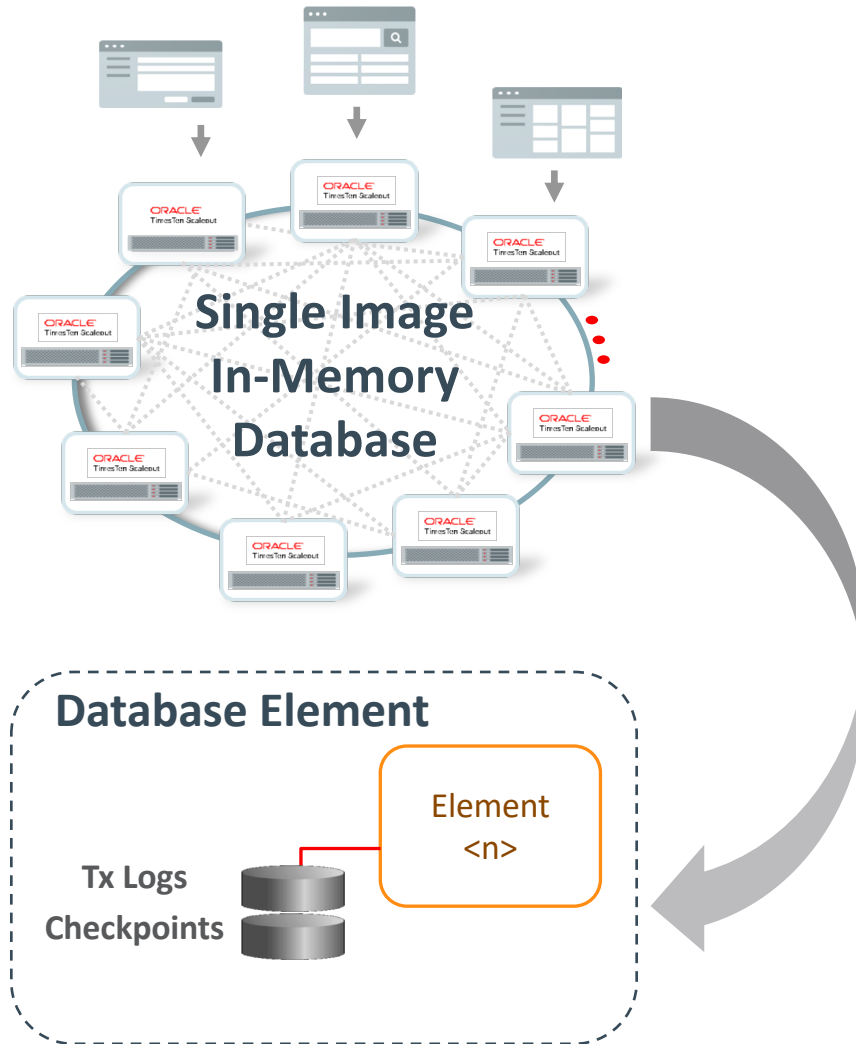
Single-Image Database with High Availability and Elasticity

- Appears to applications as a single database
 - **Not** as a sharded database
- Scale-out and scale-in
 - Data automatically redistributed
 - Workload automatically uses new elements
- Built-in HA via multiple fully-active copies
 - Copies automatically kept in sync
- Highly compatible with Oracle Database
 - Data types, APIs, SQL & PL/SQL



TimesTen Scaleout - Database Elements

Unit of Persistence and Recovery



- Each database consists of *elements*
- Each *element* stores a portion of data from its database
- Each *element* has its own set of checkpoint files and transaction log files for persistence
- The *element* is the smallest unit for database persistence, failure recovery and high availability

TimesTen Scaleout - Database Elements

A “logical” look

- Each element contains:
 - Information about all *users* in the database
 - The *schema* of the entire database
 - Some rows of each *table* in the database



Element 1

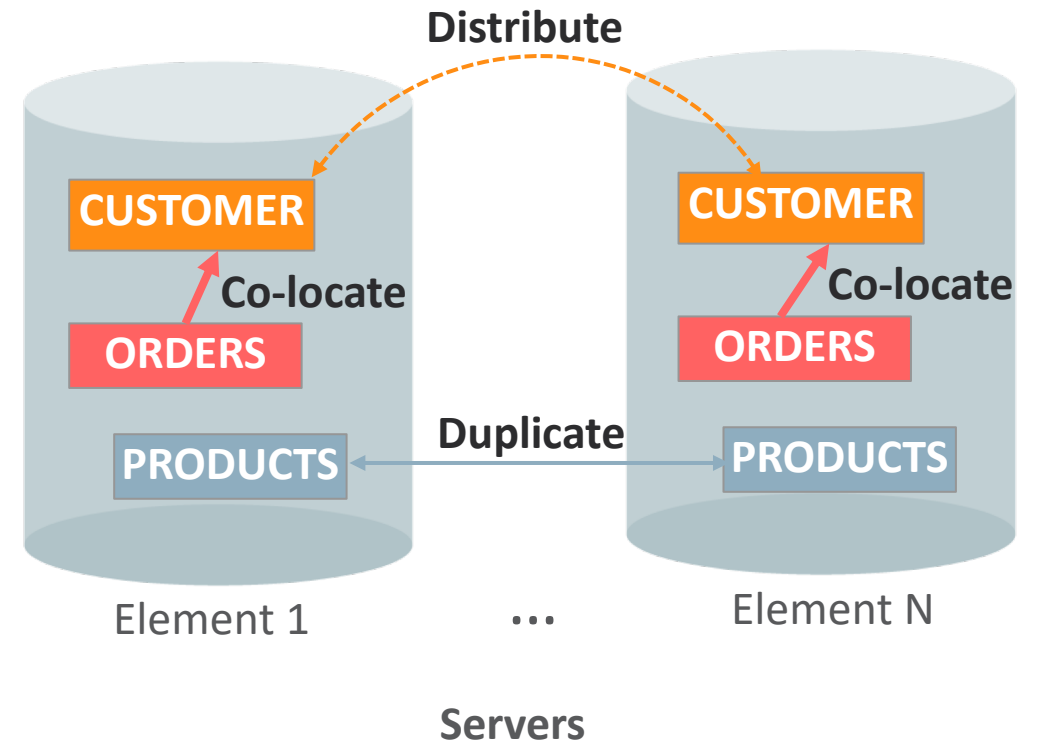


Element 2

TimesTen Scaleout - Data Distribution

Specified at the table level

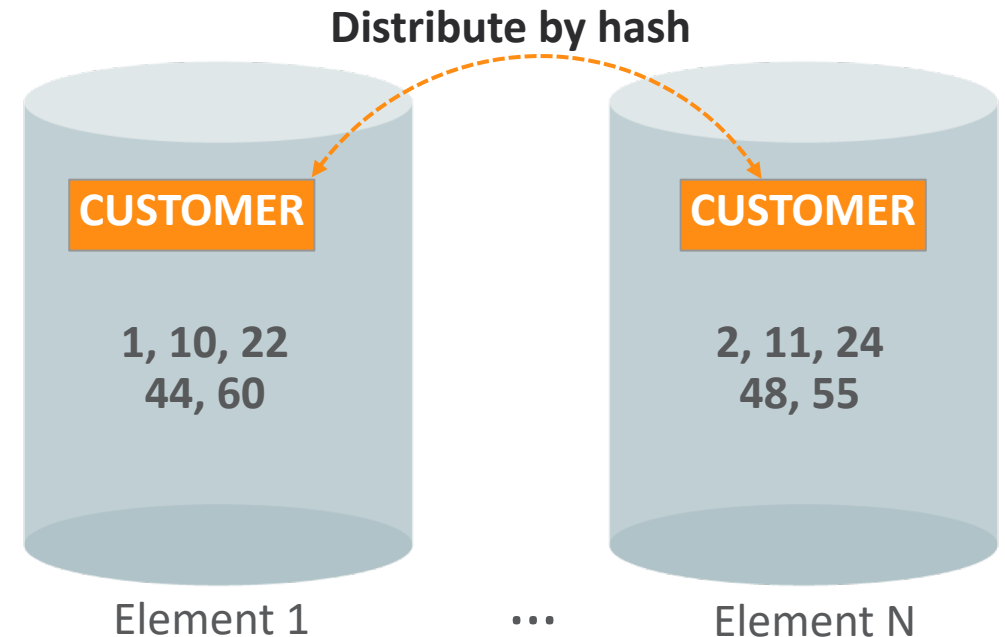
- **DISTRIBUTE** large tables by consistent hash
 - Distribute CUSTOMER rows on all elements by hash of Customer ID
- **COLOCATE** child table rows with parent table row to maximize locality
 - Place ORDERS rows in same element along with corresponding CUSTOMER row
- **DUPLICATE** small read-mostly tables on all elements for maximum locality
 - Duplicate the PRODUCT list on all elements



Distribute by Hash

- Consistent hash algorithm
- By hashing the distribution key column(s) or primary key column(s)
- Rows are “randomly” and evenly distributed across elements
- The default distribution method
 - There are ‘K’ copies of each row for HA, where ‘K’ is the K-safety factor
- Appropriate for most tables

```
CREATE TABLE CUSTOMER (  
  ID NUMBER NOT NULL PRIMARY KEY,  
  NAME VARCHAR2(100)  
) ... DISTRIBUTE BY HASH;
```

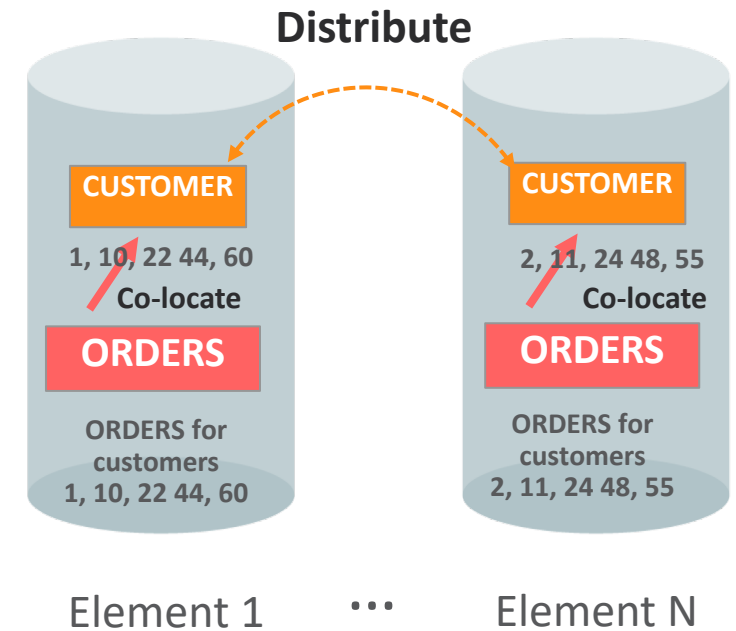


Distribute by Reference

- “Child” rows are located in the same elements as “parent” rows
- Foreign keys define “parents” and “children”
- Appropriate for tables that:
 - Are logically “children” of a single “parent” table
 - Parent and child will often be referenced together in queries
- Locating related data together provides best performance provided access is mainly via the ‘reference’ FK

```
CREATE TABLE CUSTOMER (  
  ID NUMBER NOT NULL  
  PRIMARY KEY,  
  NAME VARCHAR2(100)  
  ...  
) DISTRIBUTE BY HASH;
```

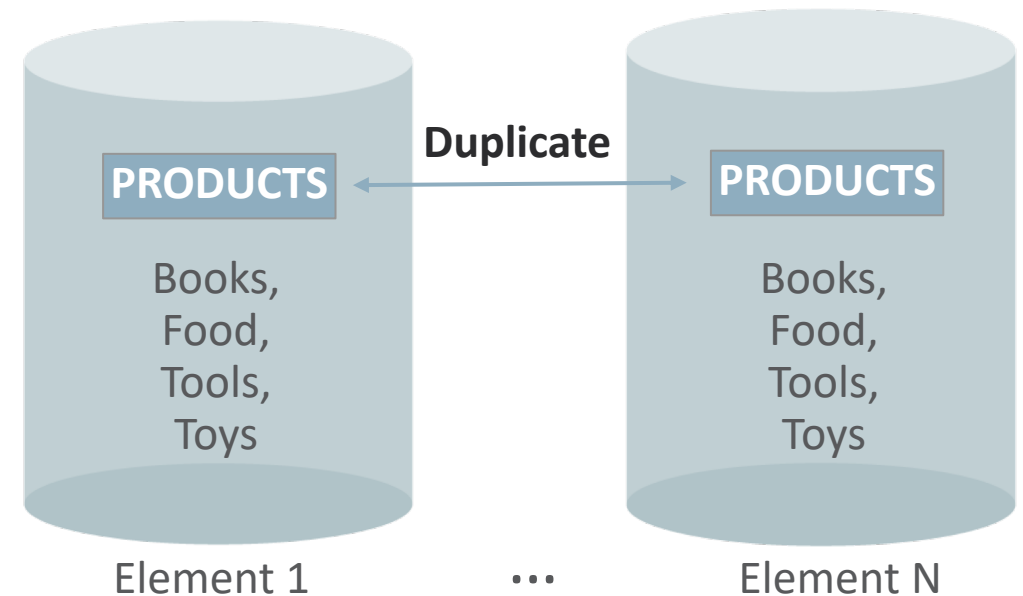
```
CREATE TABLE ORDERS (  
  ID NUMBER NOT NULL  
  PRIMARY KEY,  
  CUST_ID NUMBER NOT NULL,  
  FOREIGN KEY (C)  
  REFERENCES CUSTOMER(ID),  
  ...  
) DISTRIBUTE BY REFERENCE;
```



Duplicate

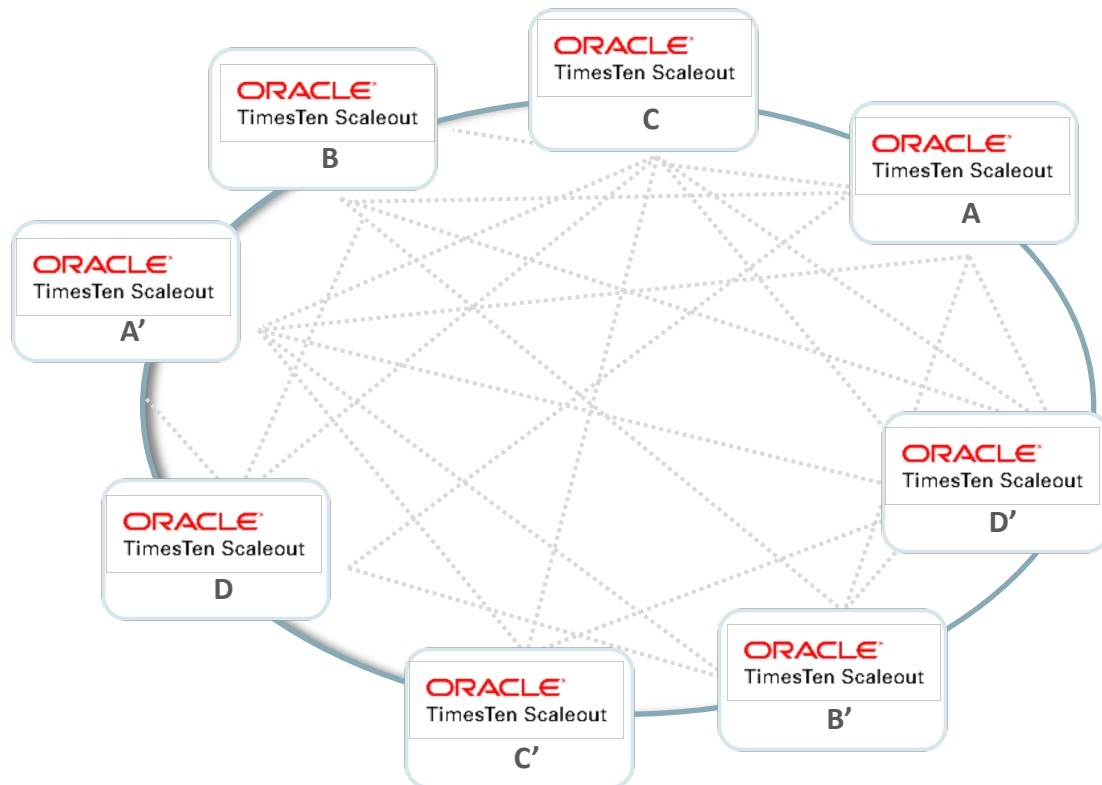
- Every row is present in every element of the grid
- Appropriate for tables that are:
 - Relatively small
 - Frequently read
 - Infrequently modified

```
CREATE TABLE PRODUCTS (  
  Prod_ID      NUMBER  
              NOT NULL  
              PRIMARY KEY,  
  Prod_Name    CHAR(12)  
) DUPLICATE;
```



TimesTen Scaleout - High Availability

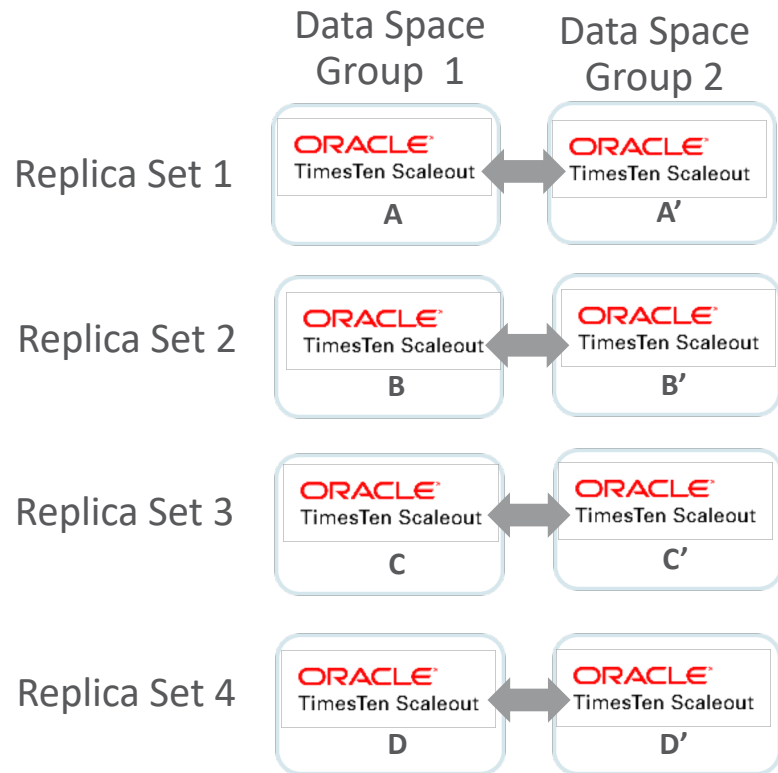
K-safety, All Active



- Built-in HA via multiple copies of the data (K-safety)
 - Automatically kept in sync
- **All** replicas are **active** for **reads** and **writes**
 - Double the compute capacity (K=2)
- Transactions can be initiated from and executed on any replica
- Queries and transactions can span any/all elements

TimesTen Scaleout - High Availability

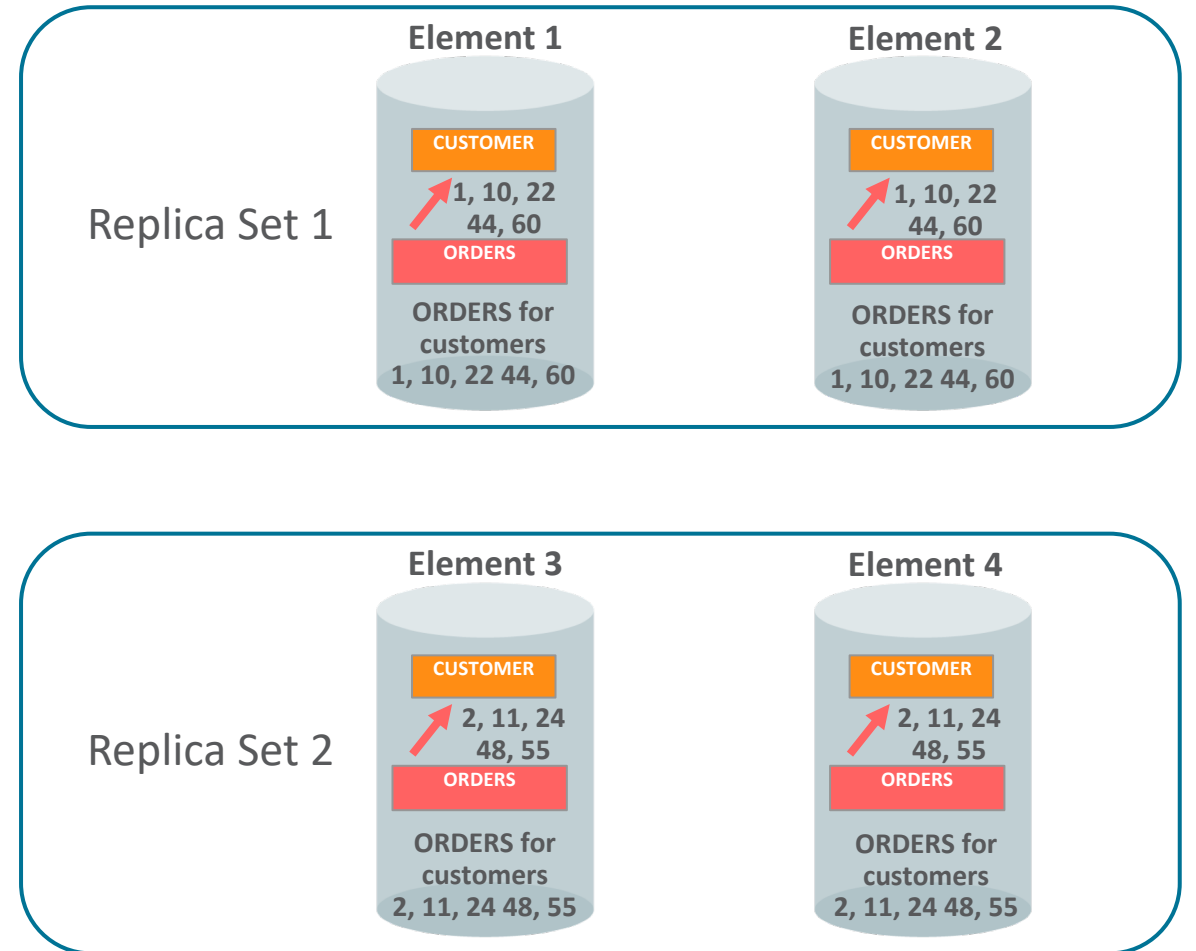
K-safety, All Active



- Built-in HA via multiple copies of the data (K-safety)
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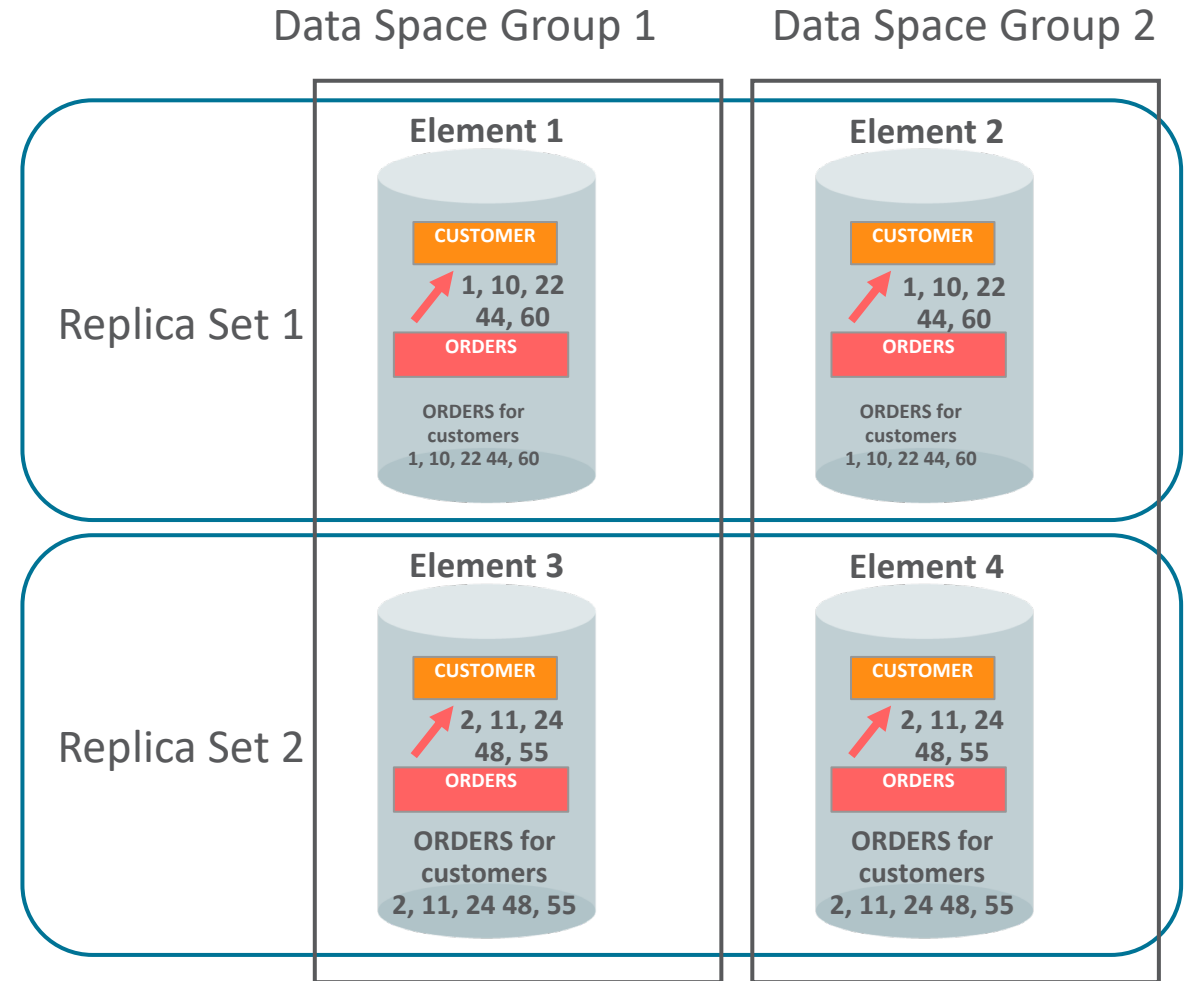
TimesTen Scaleout - Replica Sets

- Elements of a database are logically grouped into *replica sets*
- Each *replica set* contains K elements
- Elements in a *replica set* contain exactly the same data
- All elements in a *replica set* are “active”
 - Two phase commit protocols keep them in sync
- *Replica sets* are automatically created and managed



TimesTen Scaleout - Data Space Groups

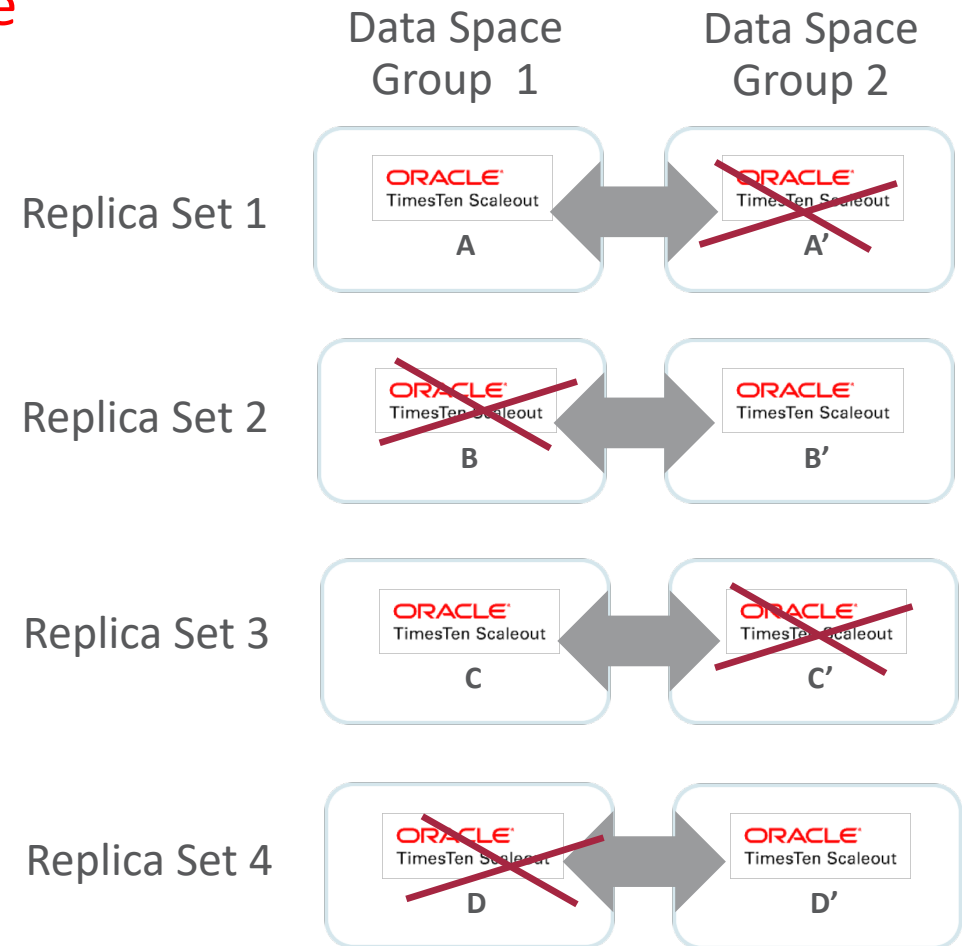
- When defining a Grid, the instance administrator must assign each host to a ***data space group***
- If $K > 1$, each host must be assigned to a specific data space group
- Each replica set is automatically created from one element on a host in each data space group
- Maximizes data availability by minimizing common failure points



Database Fault Tolerance – No Application Down Time

Provided one full copy of the database is available

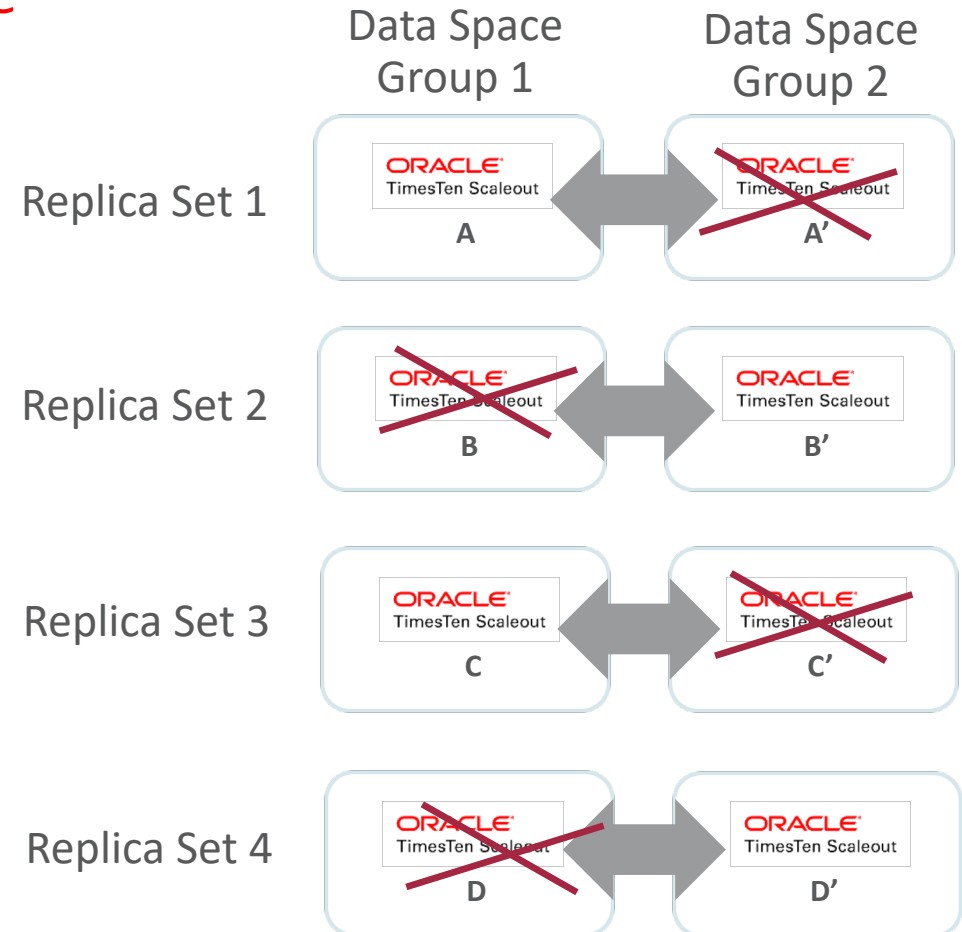
- If multiple elements fail, applications will continue provided there is one complete copy of the database



Database Fault Tolerance – No Application Down Time

Provided one full copy of the database is available

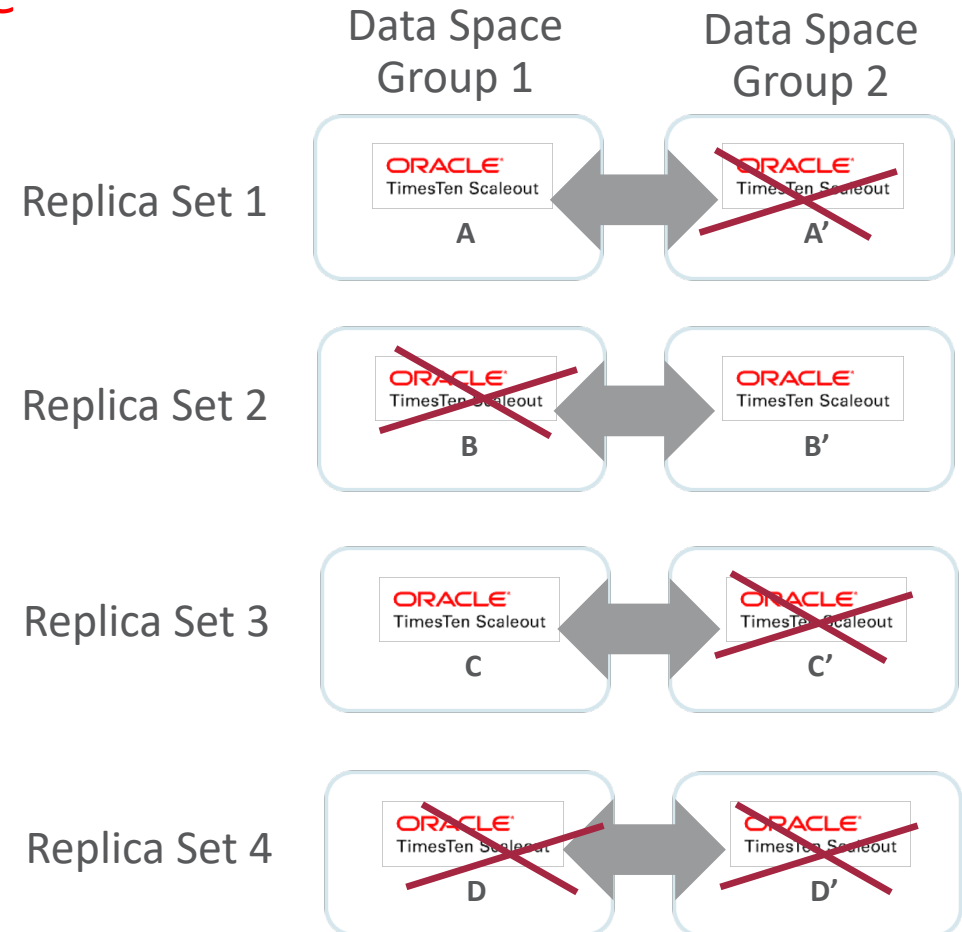
- If multiple elements fail, applications will continue provided there is one complete copy of the database
- Elements recover automatically after failure



Database Fault Tolerance – No Application Down Time

Provided one full copy of the database is available

- If multiple elements fail, applications will continue provided there is one complete copy of the database
- Elements recover automatically after failure
- If an entire replica set is down, that data is unavailable until it recovers
 - Application can **explicitly** choose to accept partial results

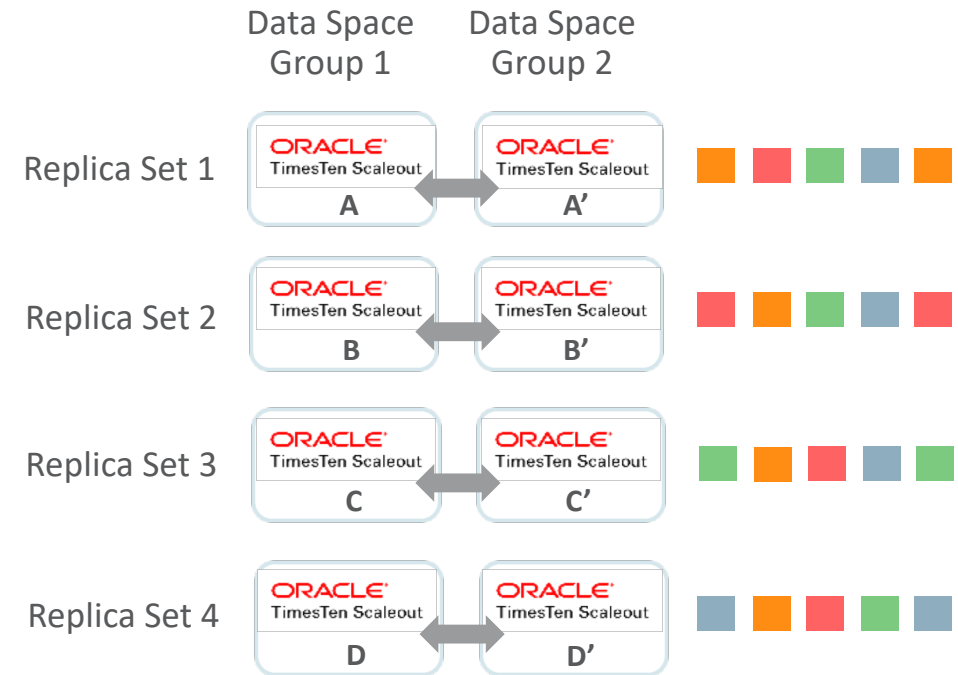


TimesTen Scaleout - Elastic Scalability

Expand and shrink the database based on business needs

Adding (and removing) database elements

- Data redistributed to new elements
- Workload automatically uses the new elements
- Connections will start to use new elements
- Throughput increases due to increased compute resources

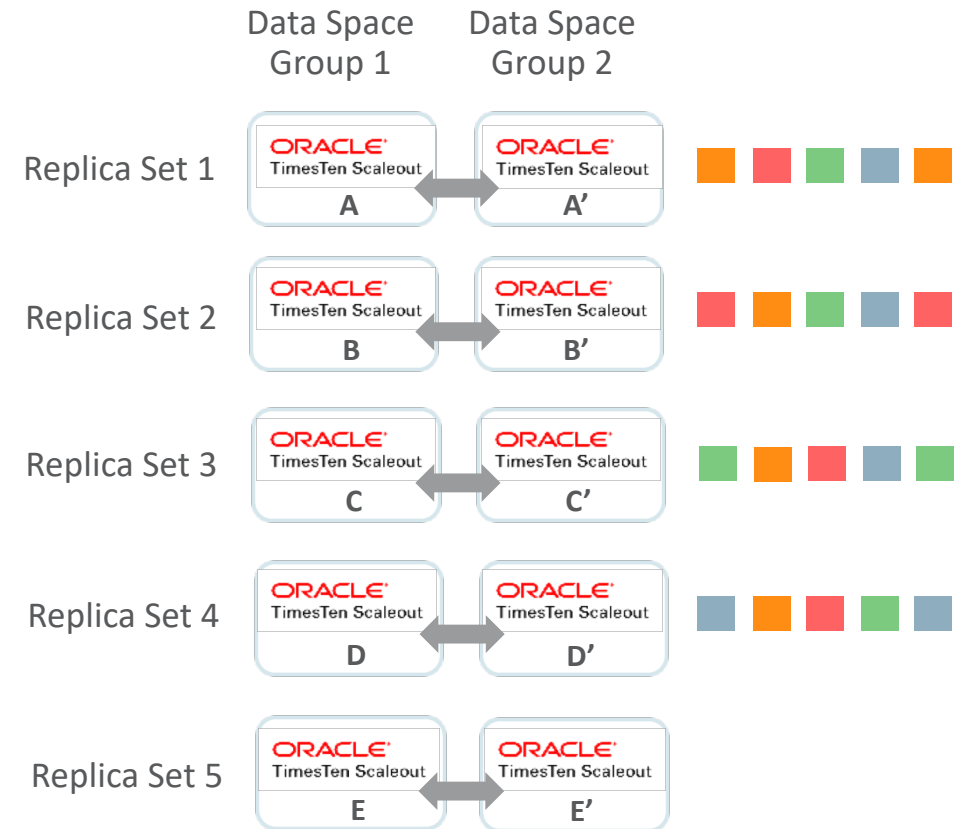


TimesTen Scaleout - Elastic Scalability

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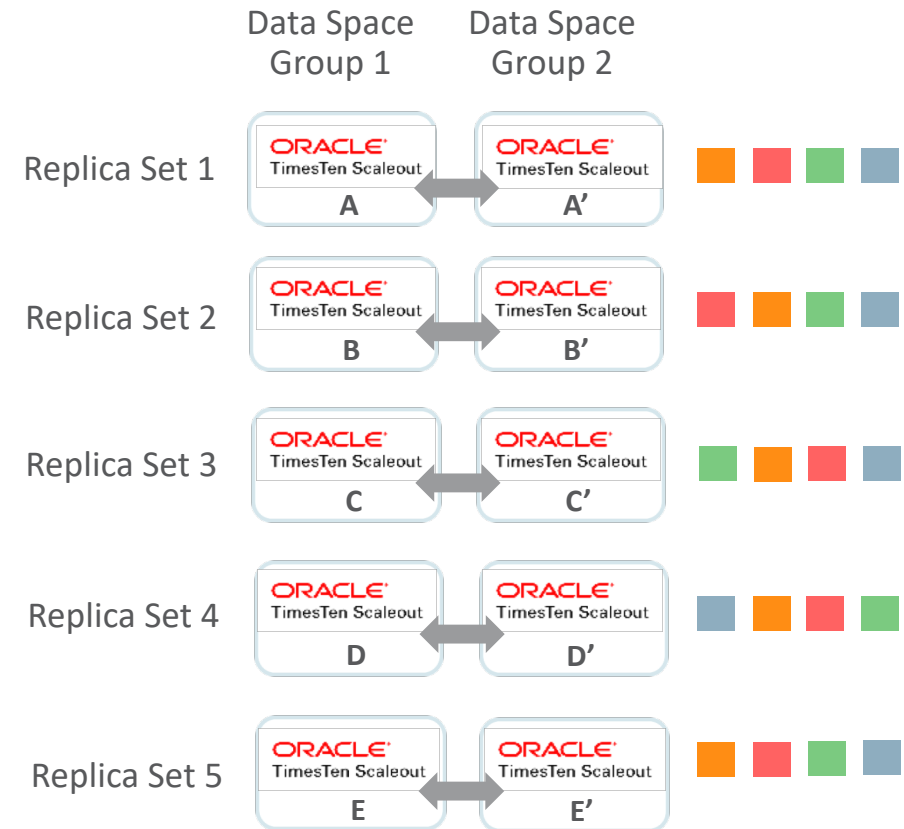


TimesTen Scaleout - Elastic Scalability

Expand and shrink the database based on business needs

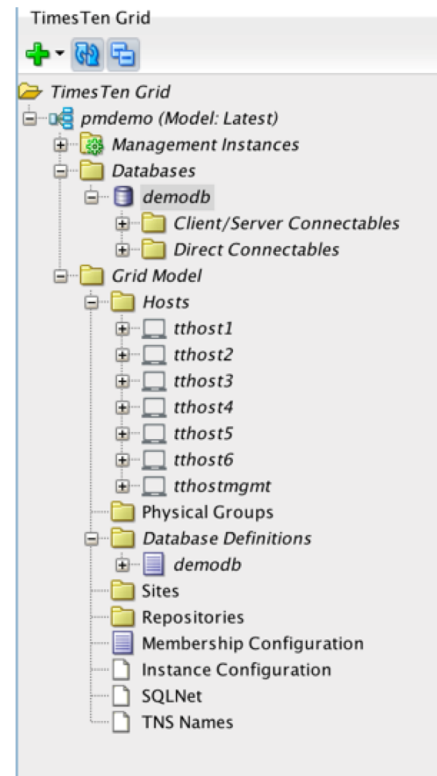
Adding (and removing) database elements

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Centralized Installation and Management

- All TimesTen Scaleout management and admin operations are performed from a single host
 - Installing software
 - Patching software
 - Configuration
 - Database creation and management
 - Backup and restore
 - Monitoring
 - Collecting diagnostics
- Command line interface
- SQL Developer (GUI) interface



TimesTen Grid

Status Database Definition Topology

Database demodb status is: created, loaded-complete, open

Number of application connections to demodb: 0

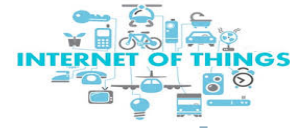
Number of system connections to demodb: 168

Database distributed in 6 instances

Element ID	Host name	Instance Name	In Distribution Map	Data Space Group
1	tthost1	instance1	Yes	1
2	tthost2	instance2	Yes	2
3	tthost3	instance3	Yes	1
4	tthost4	instance4	Yes	2
5	tthost5	instance5	Yes	1
6	tthost6	instance6	Yes	2



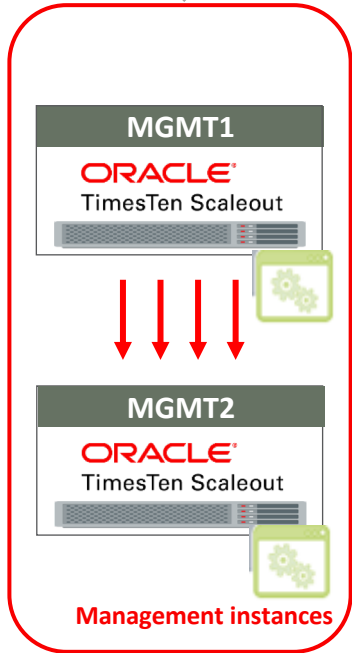
SQL



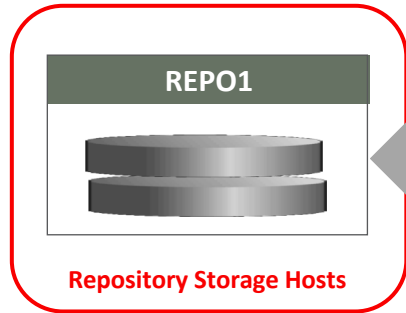
External Network

TimesTen Scaleout Architecture Overview

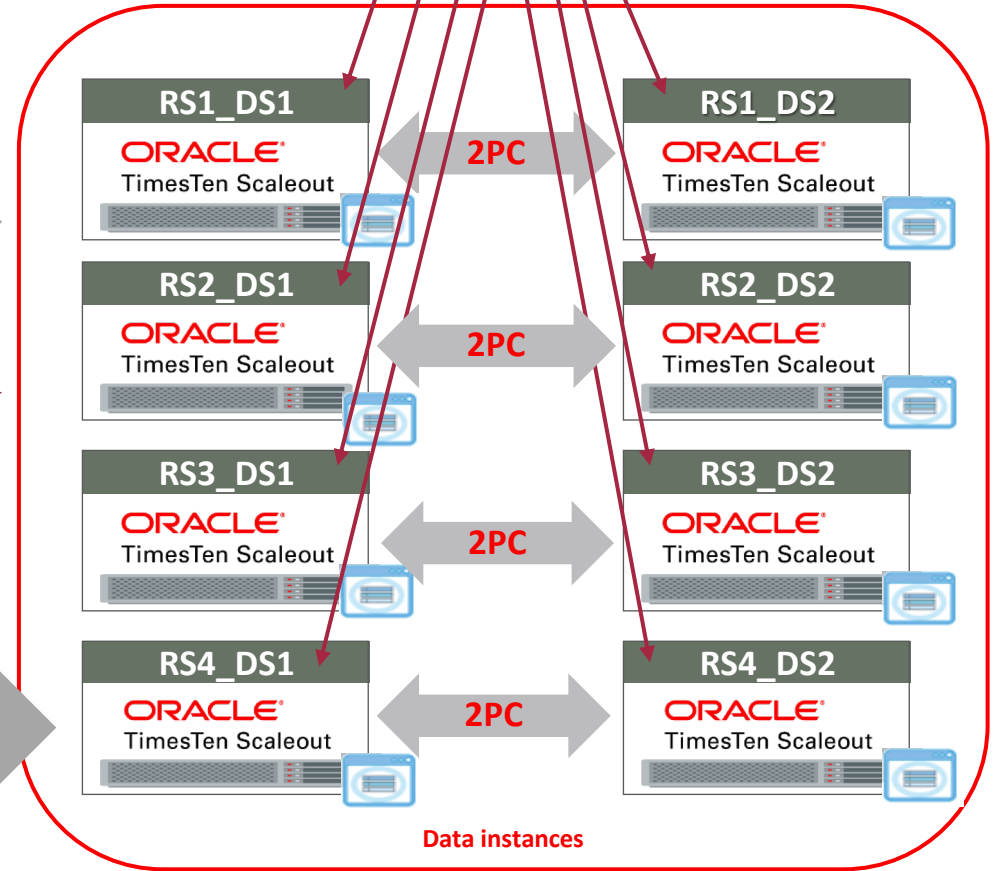
SSH



SSH & SCP



MOUNT / SCP



China Mobile Marketing Promotion System

Chongqing Mobile Subsidiary

Application Overview

- Industry : Telecom
- Business : Business & Operation Support System
- Application : Marketing Promotion System
 - Promote China Mobile products to various channels including website, APPS, SMS, WeChat, etc.
 - 30 million target subscribers
 - 15 million successful promotions per day

Challenges

- Highly concurrent mobile locations based query
 - For every subscriber in the mobile carrier network
- High transaction throughput with consistent low latency
 - Read mostly application with small amount of DML and DDL
- Scalability to achieve higher throughput

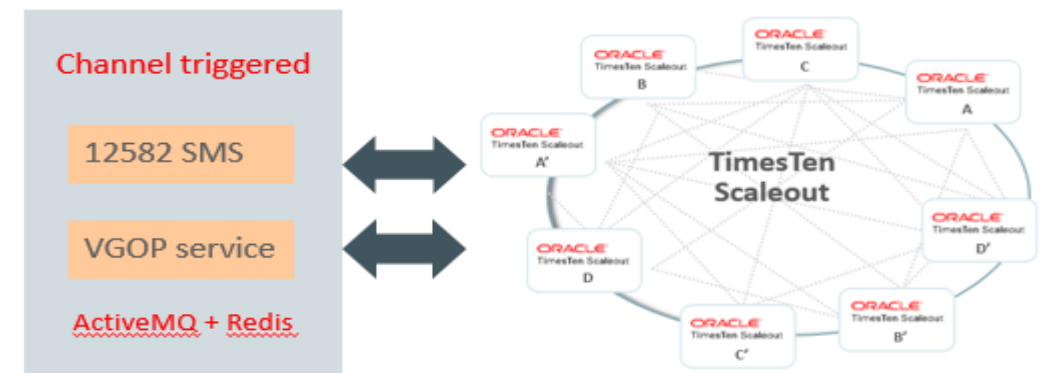
Solution

- TimesTen Scaleout with K=2 for High Availability

Why TimesTen Scaleout ?

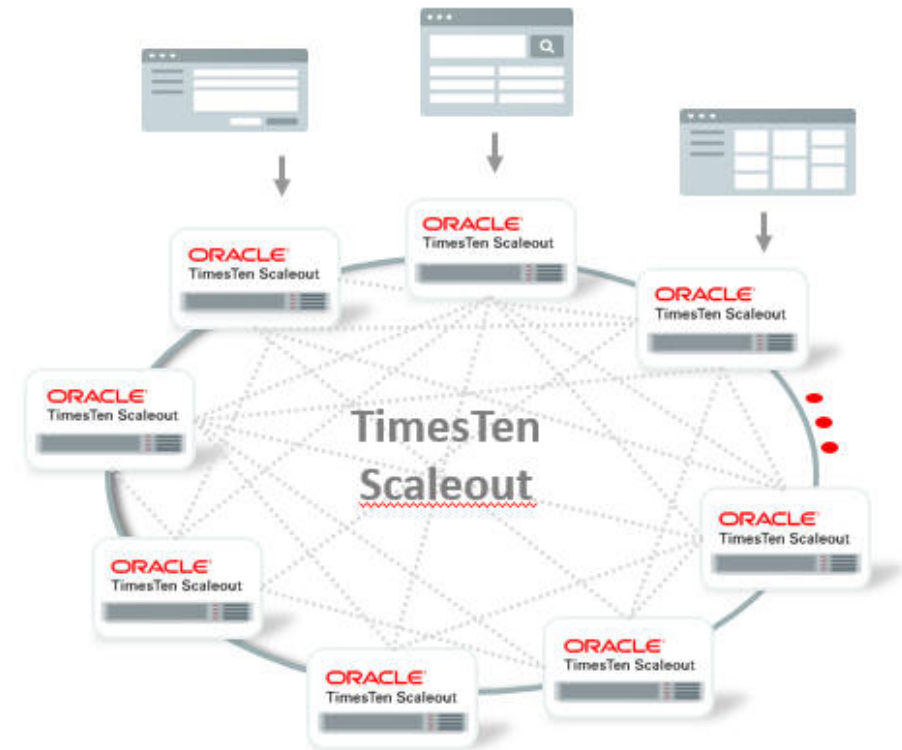
- End-to-end response time ~200 milliseconds via C/S connection mode
- New LBS (location based service) module with 2000 concurrent connections in peak time
- Easy, automatic high-availability
- No application code changes moving from TimesTen 11.2.2 to TimesTen Scaleout
- Scalability for future growth

Marketing Promotion System currently supports over 30 million subscribers and populate 15 million marketing messages per day.



TimesTen Scaleout Summary

- Extreme performance
- Single database image, data location transparency
- Full SQL, ACID transactions
- Automatic high availability via K-safety
- Elastic scale-out and scale-in
- Easy to deploy and manage
- Easy application development
- On-premises or Cloud deployment

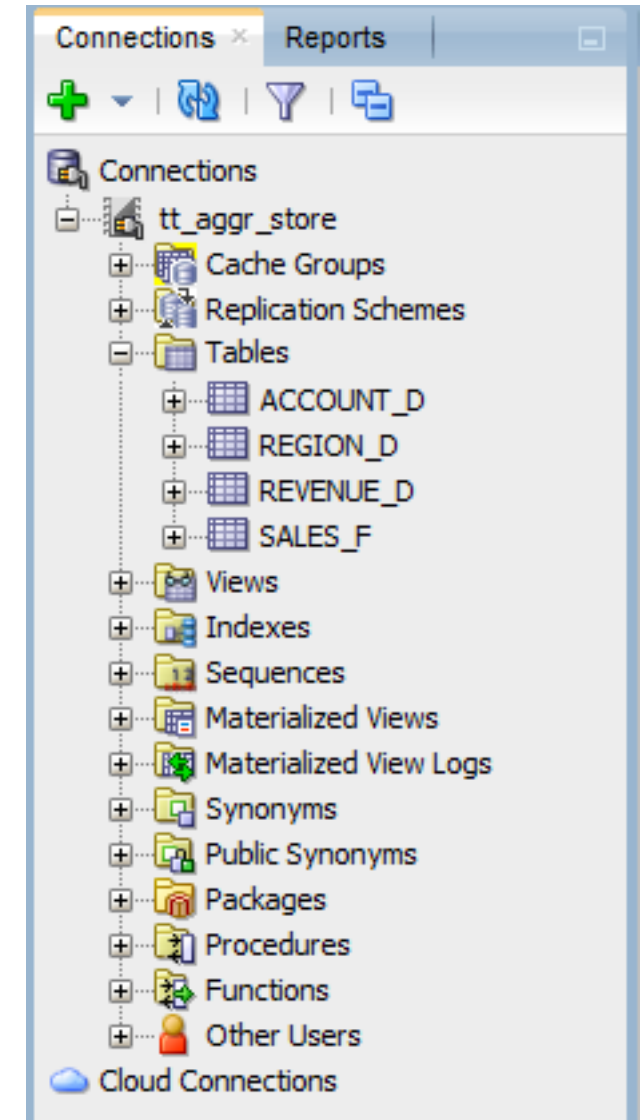


Developing Applications for TimesTen

TimesTen Integration with SQL Developer

Database Application Development

- Develop TimesTen database applications
 - Tables, PL/SQL procedures/functions, Cache Groups, etc.
- Run TimesTen built-in procedures and utilities
- Run adhoc queries with SQL worksheet
- Copy and load data in parallel
- Tune table indexes with TimesTen Index Advisor



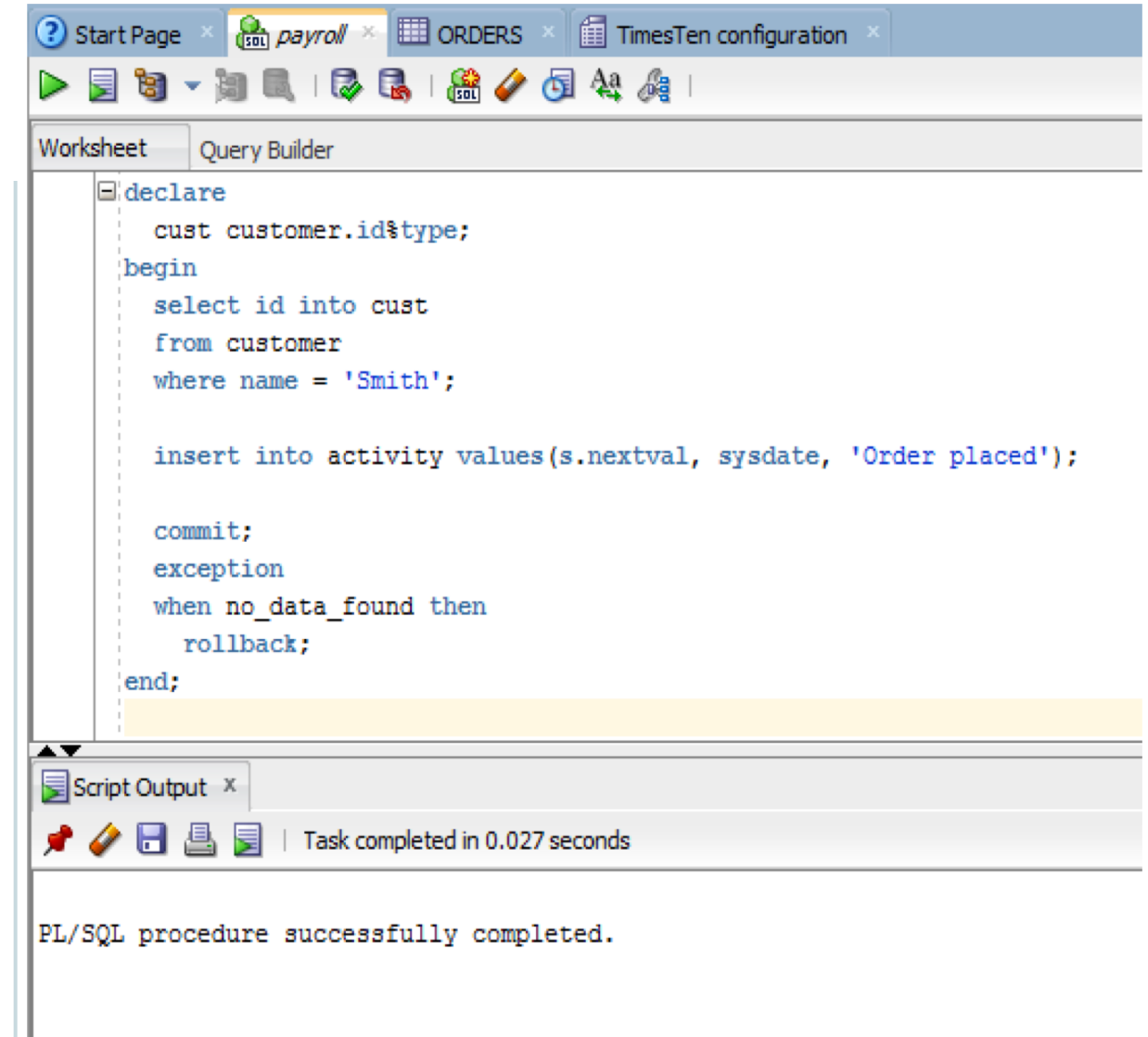
Defining your Data Model

- Standard relational schema
- Compatible with Oracle Database
- Database objects:
 - Users, tables, views, indexes, sequences, ...
- Standard data types
 - NUMBER, VARCHAR2, TIMESTAMP, ...
- SQL Developer makes it easy to create and view schema

The screenshot displays the Oracle SQL Developer interface. On the left, the 'Connections' pane shows a tree view for the 'payroll' database, including 'Tables' (CUSTOMER, ORDERS) and 'Views'. The 'ORDERS' table is selected, showing its columns: ID, CUST_ID, WHEN_PLACED, and WHEN_FULFILLED. On the right, the 'SCOTT.ORDERS' table structure is shown with columns: ID (PK), CUST_ID (FK), WHEN_PLACED, and WHEN_FULFILLED. Below it, the 'SCOTT.CUSTOMER' table structure is shown with columns: ID (PK), NAME, STREET_ADDR, CITY, and STATE. A relationship arrow points from SCOTT.ORDERS to SCOTT.CUSTOMER, indicating a foreign key relationship on the CUST_ID column.

Manipulating data

- Standard SQL
 - Compatible with Oracle Database
- INSERT, DELETE, UPDATE, SELECT, MERGE, ...
- PL/SQL procedural language
- Standard transactions
 - Commit and Rollback
 - Full ACID transactions



The screenshot shows the Oracle SQL Developer interface. The main window displays a PL/SQL procedure in the Query Builder tab. The procedure is as follows:

```
declare
  cust customer.id%type;
begin
  select id into cust
  from customer
  where name = 'Smith';

  insert into activity values(s.nextval, sysdate, 'Order placed');

  commit;
exception
  when no_data_found then
    rollback;
end;
```

Below the code editor, the Script Output window shows the execution result: "Task completed in 0.027 seconds" and "PL/SQL procedure successfully completed."

Application Development



- Industry standard and Oracle compatible SQL, PL/SQL and APIs
- Flexible application development
- Nearly any programming language
- Nearly any environment

ORACLE®
TimesTen

Coming soon:

This section features a red dashed border enclosing several logos for technologies that are "coming soon":

- node.js logo
- python logo
- GO logo (with a blue character)
- REST APIs logo (with a green curly brace icon)
- Ruby logo (with a red gem icon)
- A red database icon with an upward arrow.

Application Development

- Java:
 - Standard JDBC API
 - Works with development tools...
 - Hibernate, OpenJPA, ...
 - Works in app servers and servlet containers
 - Weblogic, Tomcat, Websphere, ...
- C / C++: OCI, ODBC, Pro*C
- Windows: .NET (ODP.NET)

```
stmt = con.prepareCall("begin do_it(:delay, :want, :out); end;");
stmt.setInt(1, delayTime);
stmt.setInt(2, wantRowCts);
stmt.registerOutParameter(3, Types.VARCHAR, 32767);
stmt.execute();
json = stmt.getString(3);
con.commit();
```

Application Development

- PHP
- Coming Soon:
 - Python
 - Go
 - Node.JS
 - ...

***Get In Memory
Performance using APIs
and interfaces you already
know!***

```
$ cat select1.tt.py
from __future__ import print_function

import cx_Oracle

connection = cx_Oracle.connect("scott", "tiger", "localhost/payrollcs:timesten_
client")

cursor = connection.cursor()
cursor.execute("""
    SELECT *
    FROM emp
    WHERE last_name = :last""",
    last="Drake")
for id, first_name, last_name in cursor:
    print ("Employee", id, "is", first_name, last_name)
$ python select1.tt.py
Employee 1234 is Sam Drake
$
```

```
connection.execute(
    "SELECT * " +
    "FROM emp " +
    "WHERE last_name = :last",

    ["Drake"],

function(err, result)
{
    console.log(result.metaData);
    console.log(result.rows);
    doRelease(connection);
});

$ node select1.tt.js
[ { name: 'ID' }, { name: 'FIRST_NAME' }, { name: 'LAST_NAME' } ]
[ [ 1234, 'Sam', 'Drake' ] ]
$
```


Application Development Summary

- SQL and PL/SQL
- Wide range of standard APIs to suit most languages and environments
- Official APIs and open source options
- Wide support for App Servers and OR frameworks
- Extensive integration with SQL Developer
- Developers can leverage existing RDBMS / Oracle skills

TimesTen in the Cloud

Current and Future

TimesTen in the Cloud Today

- **TimesTen 11.2.2.8.27+**
- Bring Your Own License
- Scripts to provision TimesTen on **Oracle Bare Metal Cloud (OCI)**
 - Oracle Linux 7.4, networking, storage, install and configure TimesTen
 - Optionally create an Active/Standby replication configuration for High Availability
- Unmanaged
 - Use SSH (command line) or SQL Developer to monitor/manage TimesTen yourself



TimesTen in Private Clouds

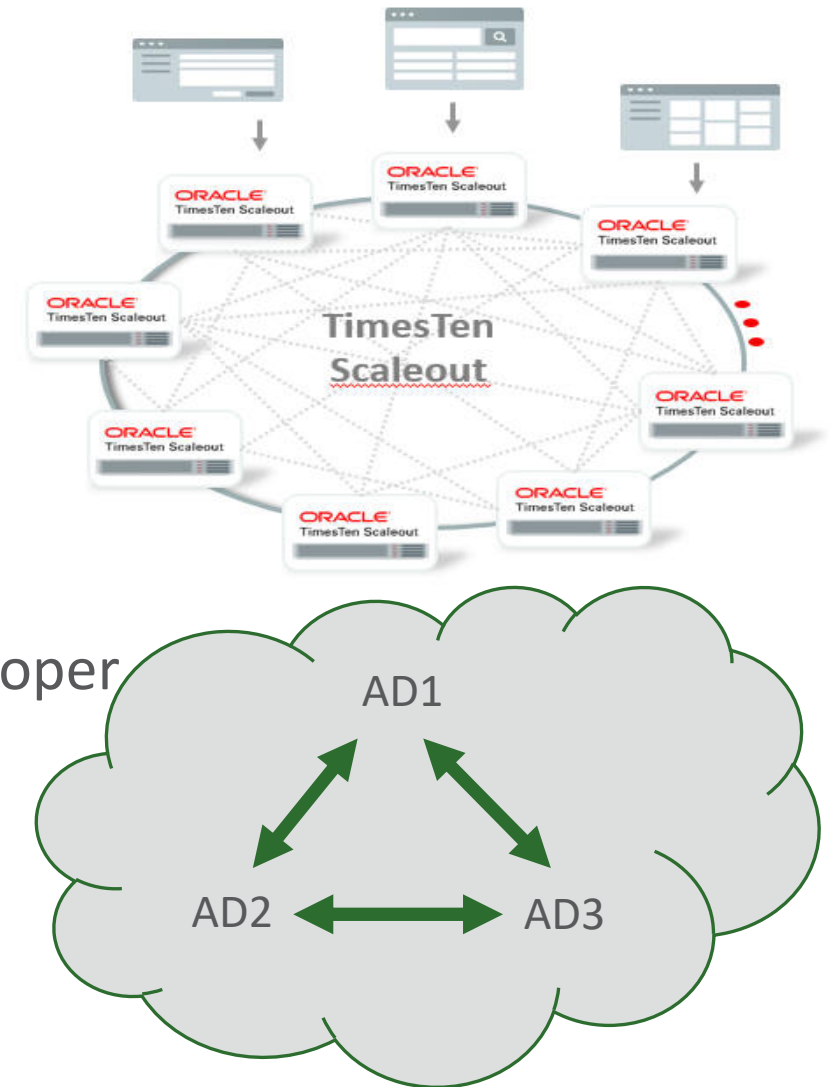
- TimesTen Database requires :
 - Linux x8664 (glibc 2.12+)
 - Oracle Linux / Red Hat / CentOS 6.4+, 7+
 - Ubuntu 14.04+
 - SUSE 12+
 - TCP/IP or IPoIB
 - A file system
 - Enough RAM for the DB



TimesTen in the Cloud - Future Plans

- **Cloud service based on TimesTen Scaleout**
- Fully Managed
 - Provisioning
 - Elastic Scaling
 - Backup/restore
 - DB Patching and upgrades
 - Data import/export
- Manage via Cloud MyServices, DB Console or SQL Developer
- High availability within or across Availability Domains
- All compute shapes which support NVMe storage
- Up to 64 elements for first release

Autopilot with manual override



Cloud Summary

- Private or Public Cloud deployment
- Flexible options for Private Cloud
- Focus on Oracle Cloud
 - BYOL today
 - Fully managed service under development

Licensing

TimesTen Licensing

- TimesTen is licensed in two ways
 - Oracle TimesTen In-Memory Database
 - Separate Product
 - Includes both TimesTen Classic and TimesTen Scaleout deployment modes
 - Does not include Cache functionality
 - TimesTen Application Tier Database Cache
 - Oracle Database Enterprise Edition option (needs an associated DB EE license)
 - In-Memory Cache for Oracle Database, with HA and DR
 - Includes Classic mode and Cache functionality only, not Scaleout

Want to learn more?

- TimesTen OTN Portal
(<http://www.oracle.com/technetwork/database/database-technologies/timesten/overview/index.html>)
 - Product Information
 - Presentations, use cases, whitepapers, FAQs, ...
 - Software Downloads
 - Product Documentation
 - Scaleout Demo / Learning VM download
- TimesTen GitHub Quickstart and Samples
(<https://github.com/oracle/oracle-timesten-samples>)

Q

&

A

Integrated Cloud

Applications & Platform Services