

Epsilon – Oracle Sharding Use Case in Public Cloud

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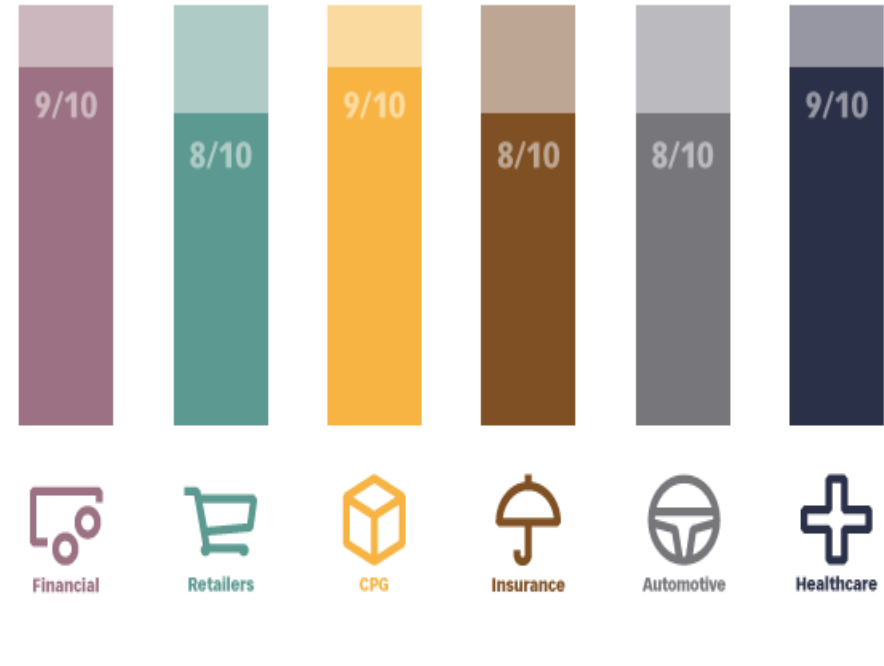
Agenda

- Snapshot of Epsilon
- Oracle Sharding Use Case in Public Cloud



Epsilon at a Glance

- Epsilon is all-encompassing global marketing company, we are global leader in turning data-driven marketing into personalized customer experience and lasting relationships
- More than 9000 associates and 70 offices worldwide
- Largest permission-based e-mailer in the world, delivering over 75 billion emails annually
- World's leading source of data with information covering over 1.5B individual records and 278M devices
- More than 2,000 global clients, including 26 of the Fortune 100
 - ▶ 9 out of 10 Top Banks
 - ▶ 8 out of 10 Top Retailers
 - ▶ 9 out of Top 10 Pharmaceutical Companies



Leader
Email marketing vendor

Leader
Database marketing service provider

Leader
Loyalty program service provider

We deliver personalized connections, build loyalty and drive business for brands around the world

EPSILON



Data

Know each of your customers on a meaningful level with Agility Audience, our premier solution offering unrivaled customer information, data resources and tools.



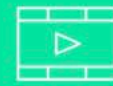
Loyalty

Create a one-of-a-kind loyalty program and grow long-lasting customer relationships with Agility Loyalty® and our full suite of loyalty capabilities and services.



Digital Messaging

Orchestrate personalized conversations taking your marketing where it needs to go with Agility Harmony®, the first platform built to be omnichannel from the ground up.



Media Reach

Optimize your media mix with the customer data, marketing technology and channels expertise that Epsilon and Conversant provide. We deliver personalized content that gets results.



Multichannel

Consolidate your approach to insights-driven multichannel marketing. Agility Unite combines unmatched consumer insights and machine learning to tailor every interaction to an individual's wants and needs across any channel.

Oracle Sharding Use Case in Public Cloud

High Level OLTP Application Business Requirements

- Loyalty real time marketing solution with extreme availability, performance and scalability requirement
- Deployment should support any public cloud as well as on premises if needed – product offering is cloud first
- Platform supports real time POS integration with average call time from 200-500ms average and each API call can have multiple (20–100) SQLs internally
- Scale out solution which can grow flexibly based on workload demand
- Scalable, reliable and highly available infrastructure along with industry standard security and auditing

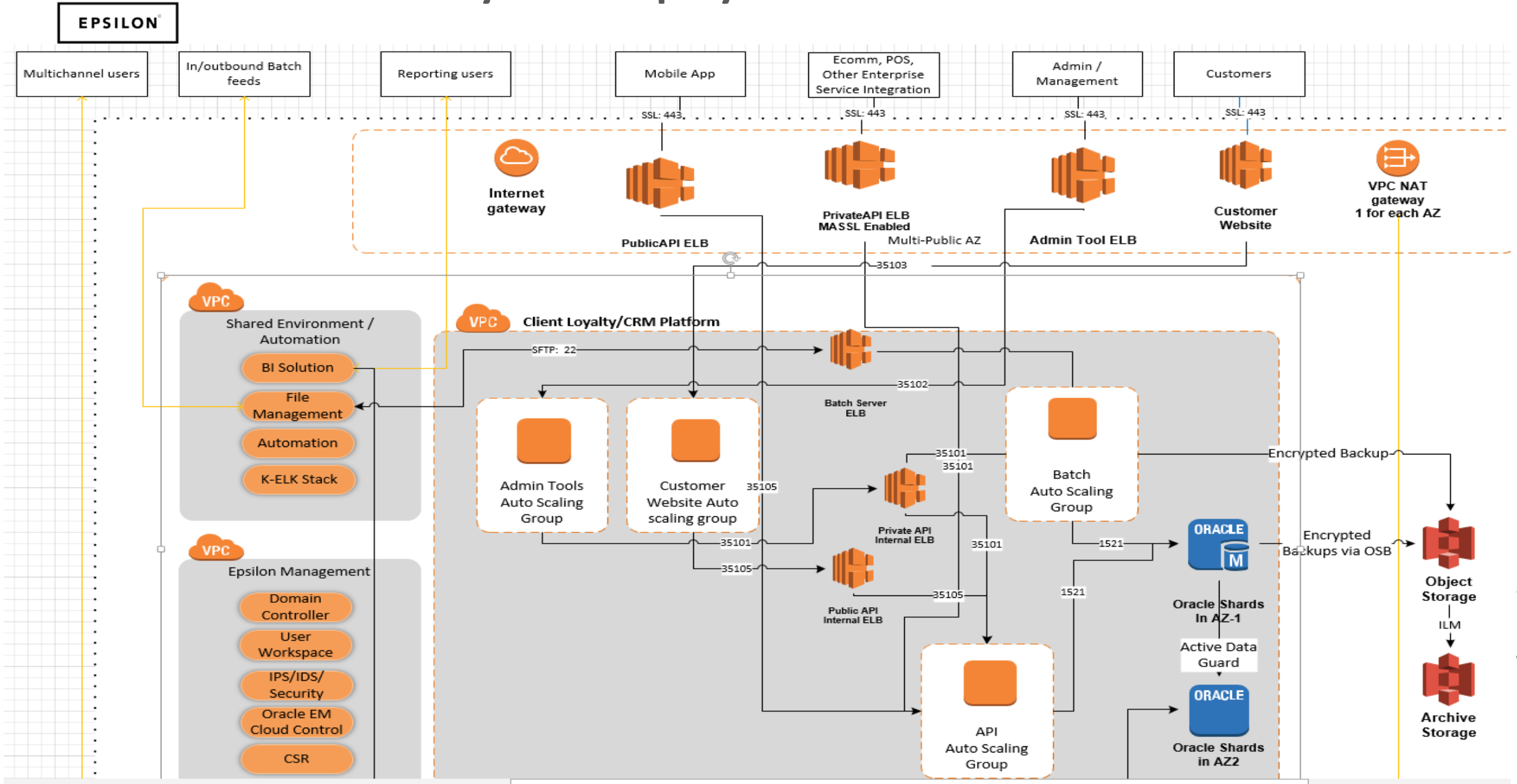
Why we like Oracle Sharding

- Loyalty marketing solution includes processing of high volume of complex financial transaction which requires strong multi version concurrency control, data protection, security, etc.
 - NoSQL solutions are not very good fit for those use cases
- Application is using many complex joins and a solution needs to support the existing code with minimal change
- Use all other existing oracle feature like data consistency, security, availability, robust performance optimizer, backup and recovery which are key for business critical application deployment and are already part of Oracle Sharding framework
- Using Oracle Sharding, OLTP database can scale up and scale out and we expect to use lesser number of shards based on workload demand

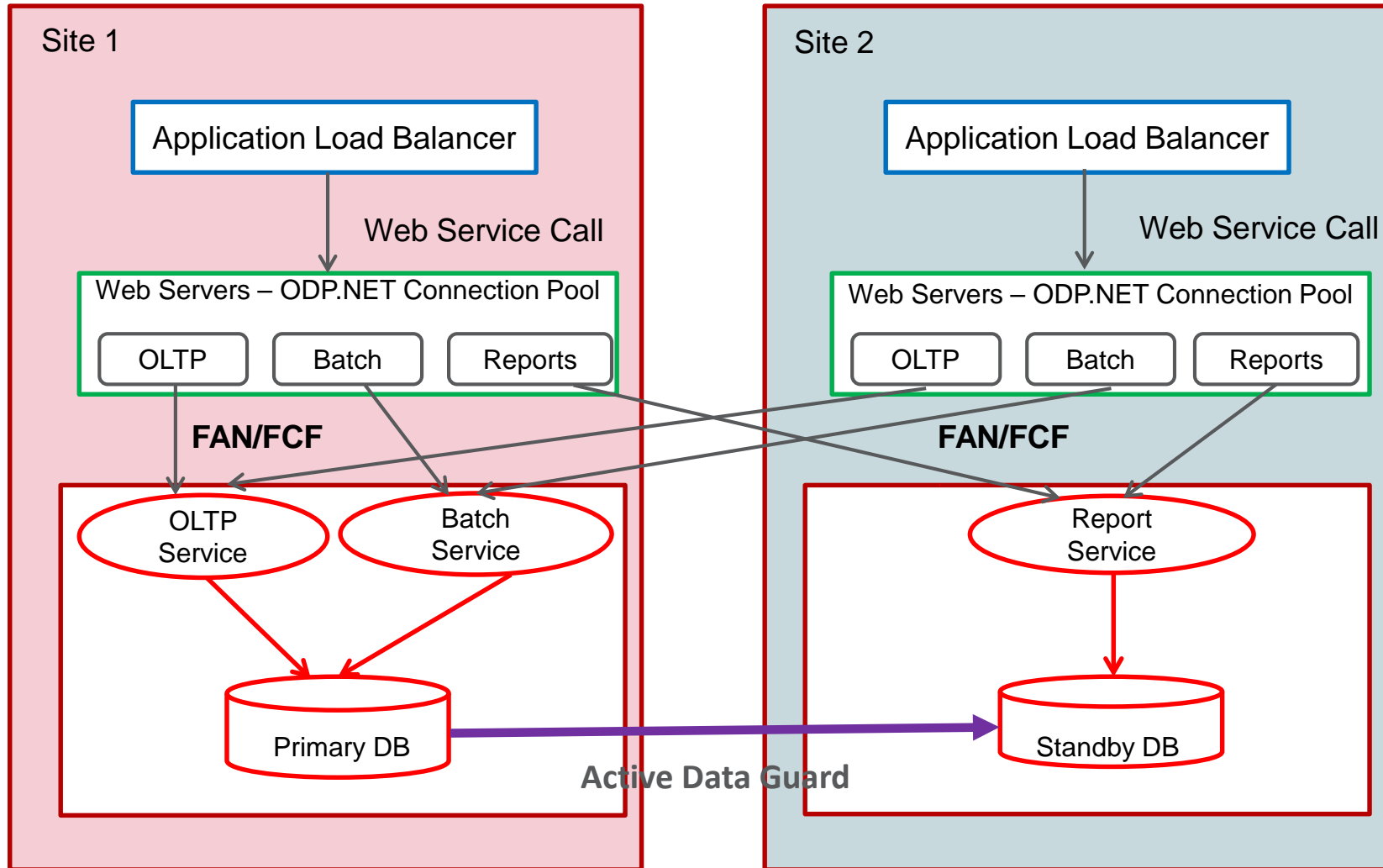
Consideration before using Oracle Sharding

- Application data model needs to change to support sharding
- Identify transaction tables which can be sharded, reference table needs to be duplicated
- Select appropriate sharding key and sharding method
- Non default global database service created using GSDCTL needs to be used for connection
- Data access for OLTP should use sharding key as much as possible to avoid cross shard operation which is expensive in terms of execution time
- Application need to use driver which has sharding support in built . Example includes Oracle JDBC, OCI, ODP.NET (unmanaged driver), Oracle UCP, etc.
- Shard catalog setup is protected with active data guard with maximum availability protection and fast start failover enabled

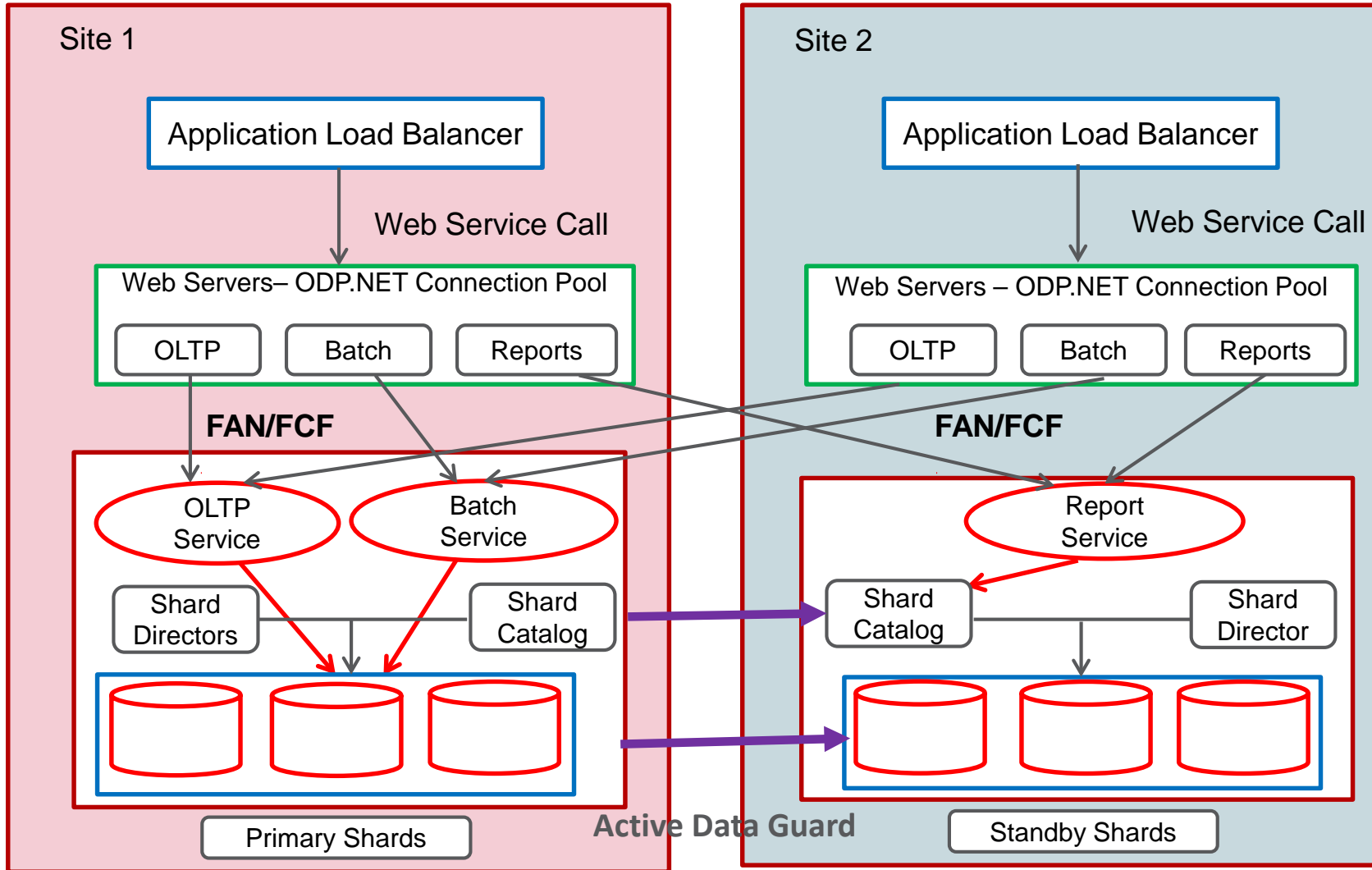
OLTP System Deployment Architecture at Public Cloud



Application Service Placement : Current State

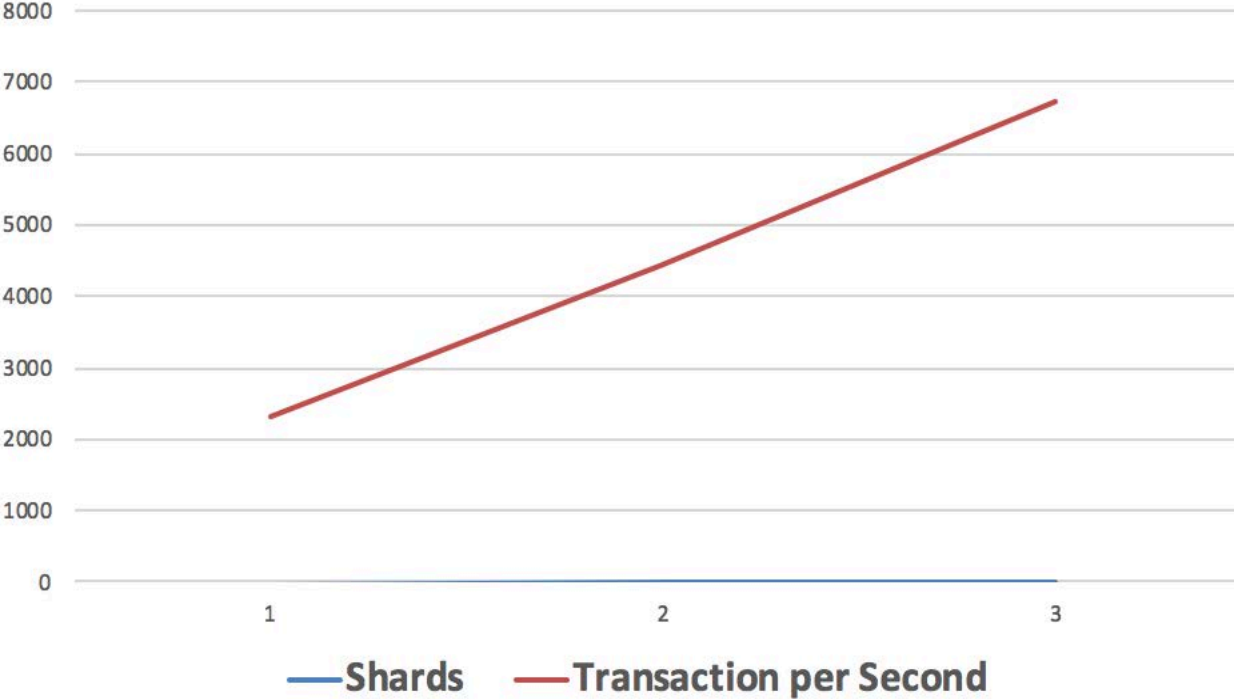


Application Service Placement : Target State with Sharding

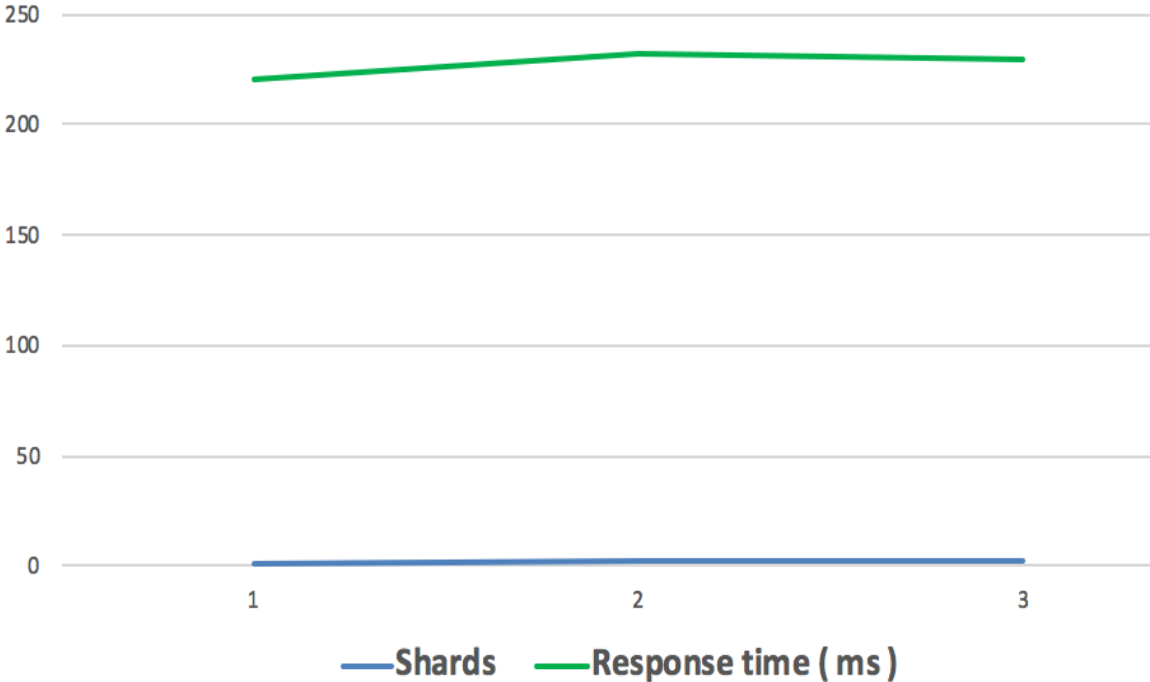


POC Result – Horizontal Scalability

Mixed Workload - TPS Analysis



Mixed Workload - Response time analysis



Best Practices

- Global service used for ODP.NET needs to have *-notification* set to TRUE using GDSCTL while configuring service for FAN
- Client side TNS should point to multiple shard directors for high availability instead of shard nodes.
- Backups should not run during chunk movement (either during re-shard operation or manual chunk movement) as that will not have correct data layout.
- During recovery, validate or recover shard option may be needed to sync it with shard catalog

Future Plans

- Collaborate with oracle engineering team to convert Epsilon loyalty solution to be sharding capable, configure application for zero downtime using features like application continuity during shard failure or re-shard operation, etc.
- Plan to deploy Oracle sharding for many customers as next generation ***true horizontally scalable multiple cloud global solution across any region*** as part of Epsilon's global loyalty platform deployment plan