Reducing Database Costs via Shard Consolidation

Steve Abraham
Principal Solutions Architect

amazon web services

Agenda

- How did we get here?
- Amazon Aurora overview
- Introduction to AWS DMS
- Solution
- Demo
- Questions

How did we get here?

Things change

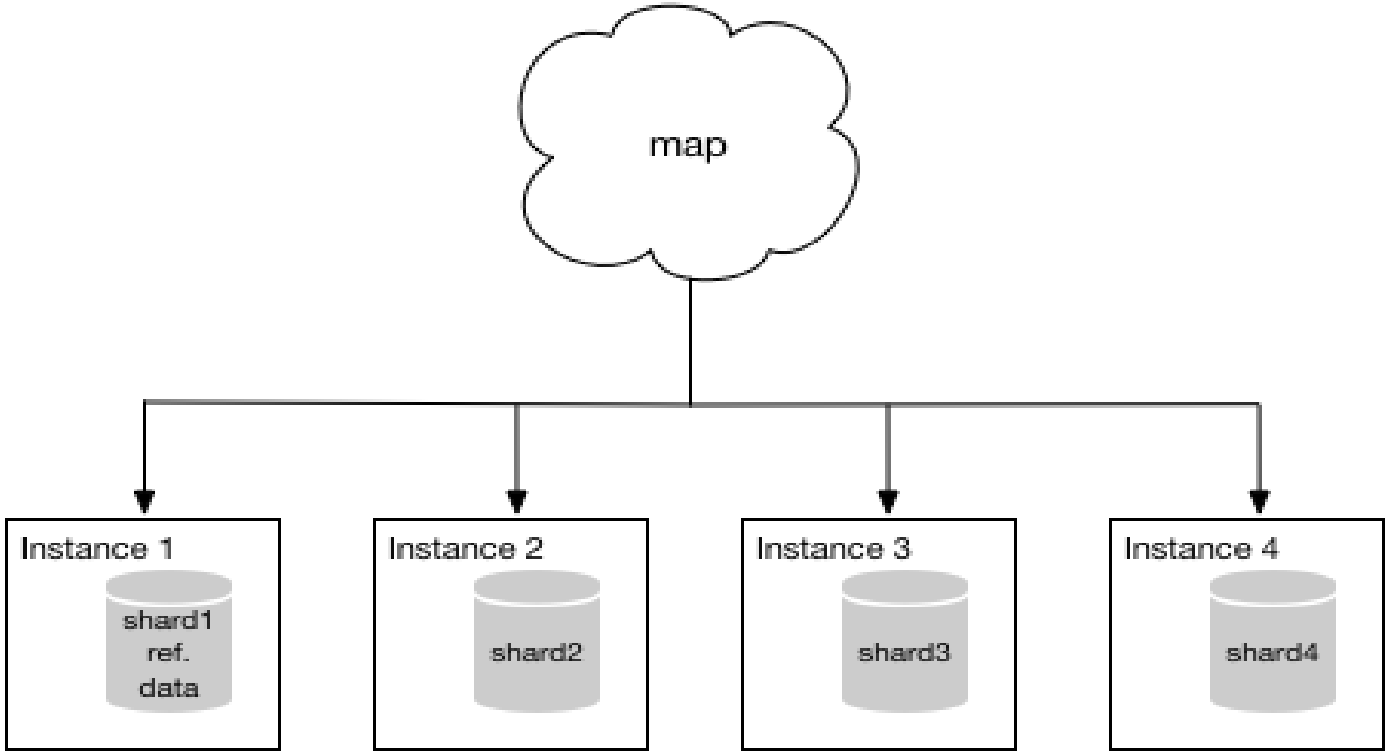
In the beginning…

- The system ran fine but then growth happened

To solve the problem you could:

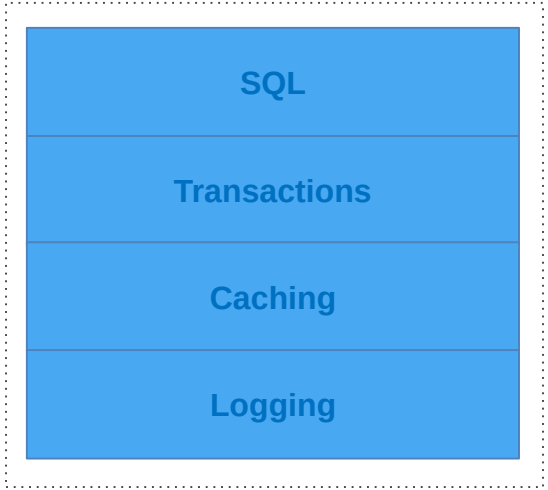
- Scale up
- Scale out

Sharding


map
Instance 1
shard1
ref.
data
Instance 2
shard2
Instance 3
shard3
Instance 4
shard4

Amazon Aurora

Relational databases were not designed for the cloud

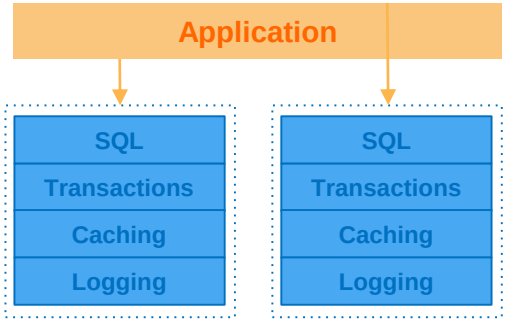


Multiple layers of functionality all in a monolithic stack

Not much has changed in last 20 years

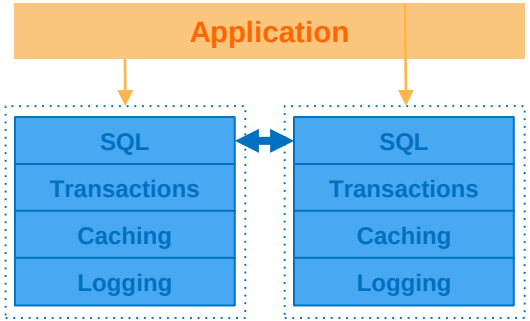
Sharding

Coupled at the application layer



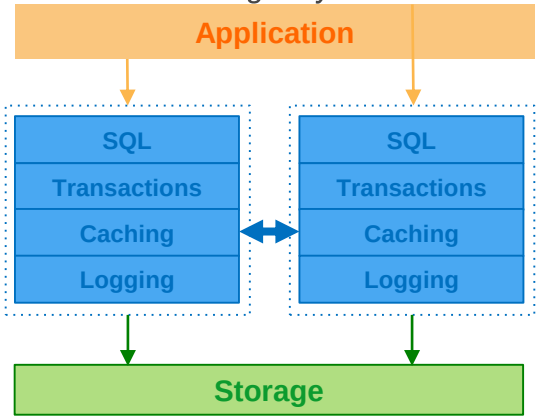
Shared Nothing

Coupled at the SQL layer



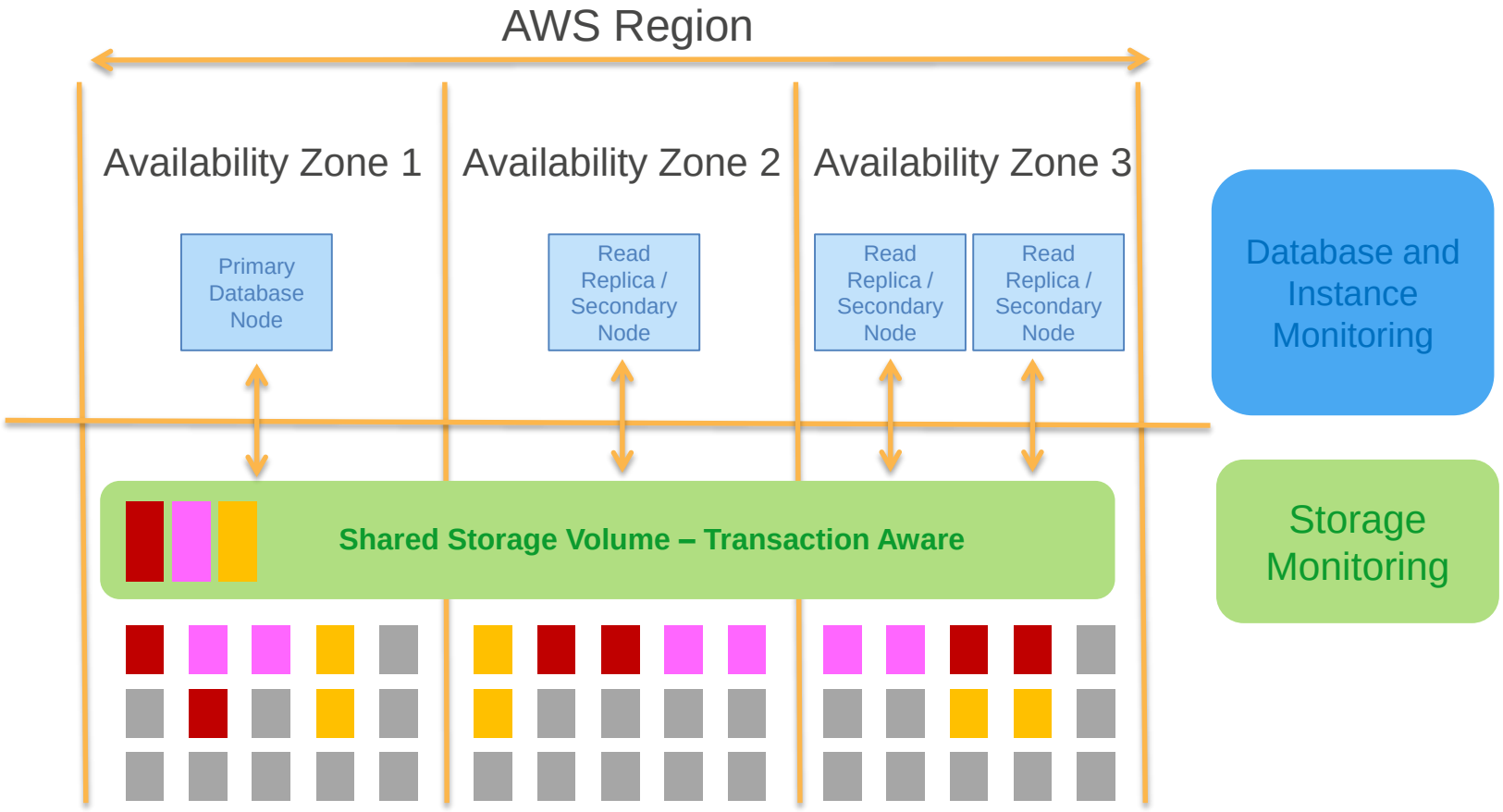
Shared Disk

Coupled at the caching and storage layer



Even when you scale it out, you're still replicating the same stack

Scale-out, distributed, log structured storage

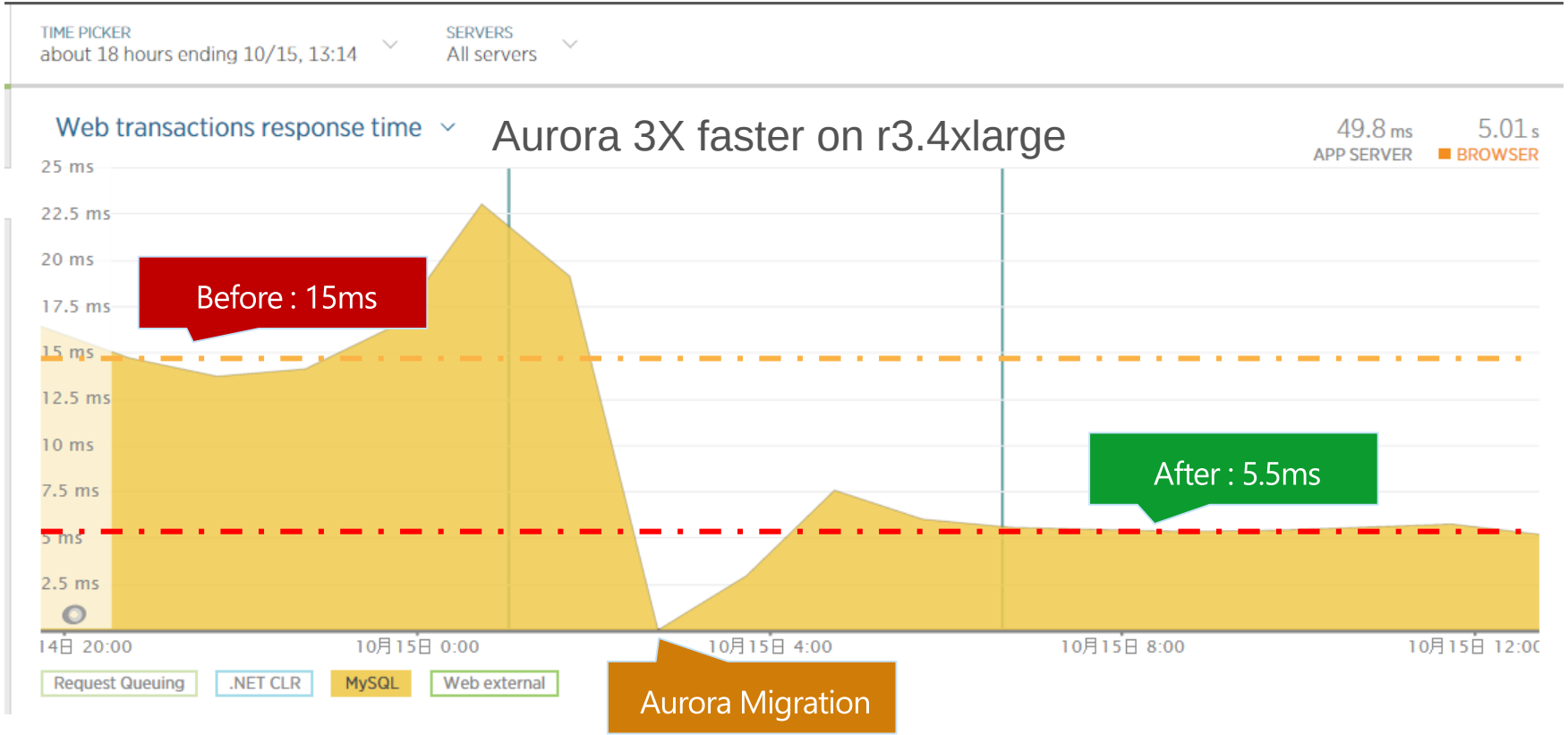


Enterprise-class performance

- Provides 5X the throughput of standard MySQL running on the same hardware.
- Achieve up to 585,000 reads and 100,000 writes per second
- Read replicas with <10ms latency

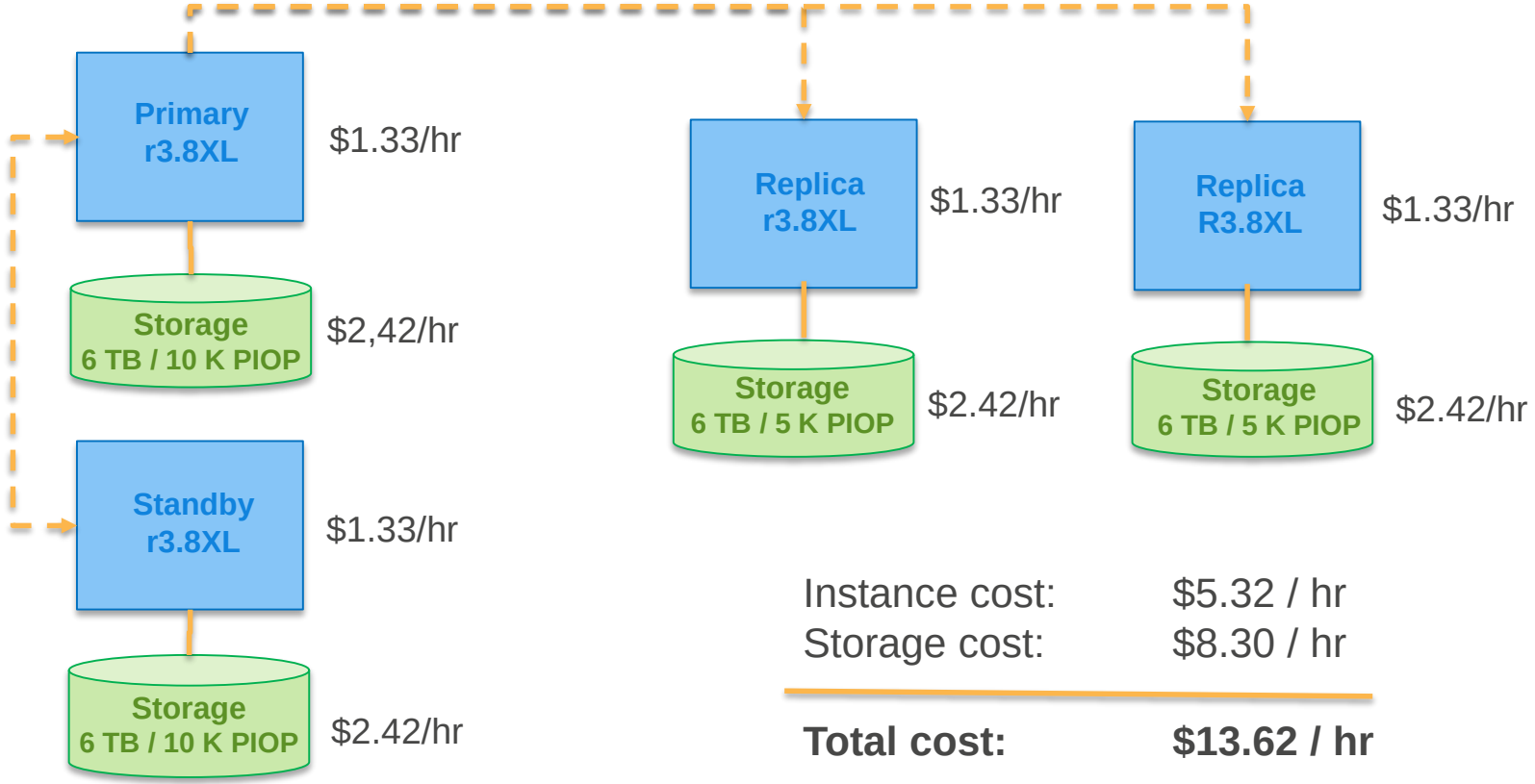
Real-life data – gaming workload

Aurora vs. RDS MySQL – r3.4XL, MAZ



Cost of ownership: Aurora vs. MySQL

MySQL configuration hourly cost

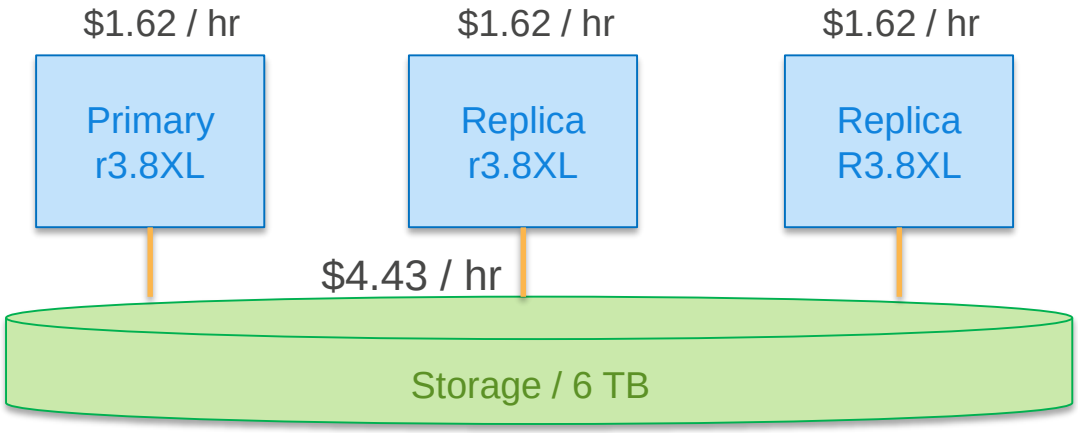


Instance cost:	$5.32 / hr
Storage cost:	$8.30 / hr
Total cost:	**$13.62 / hr**

Cost of ownership: Aurora vs. MySQL

Aurora configuration hourly cost

- No idle standby instance
- Single shared storage volume
- No PIOPs – pay for use I/O
- Reduction in overall IOP



Instance cost:	$4.86 / hr
Storage cost:	$4.43 / hr
Total cost:	**$9.29 / hr**

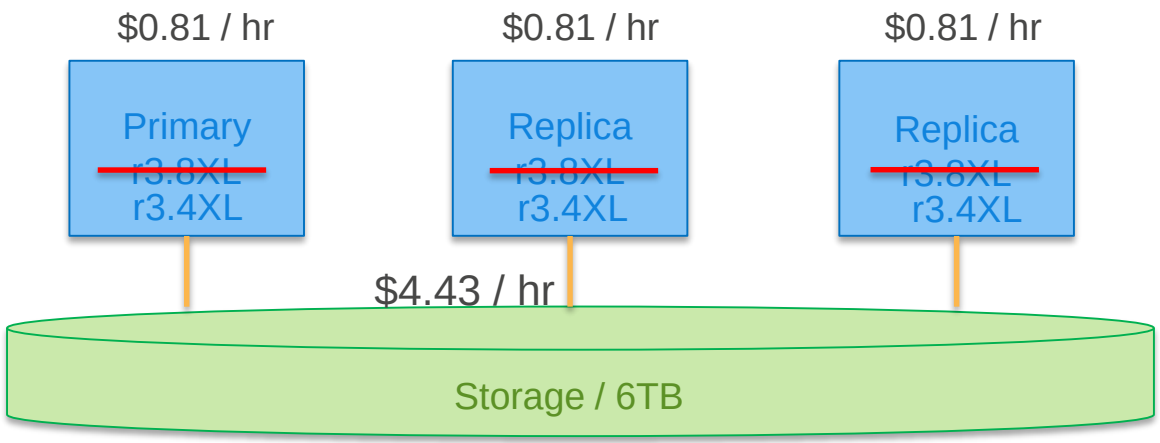
31.8% Savings

*At a macro level Aurora saves over 50% in storage cost compared to RDS MySQL.

Cost of ownership: Aurora vs. MySQL

Further opportunity for saving

- Use smaller instance size
- Pay-as-you-go storage



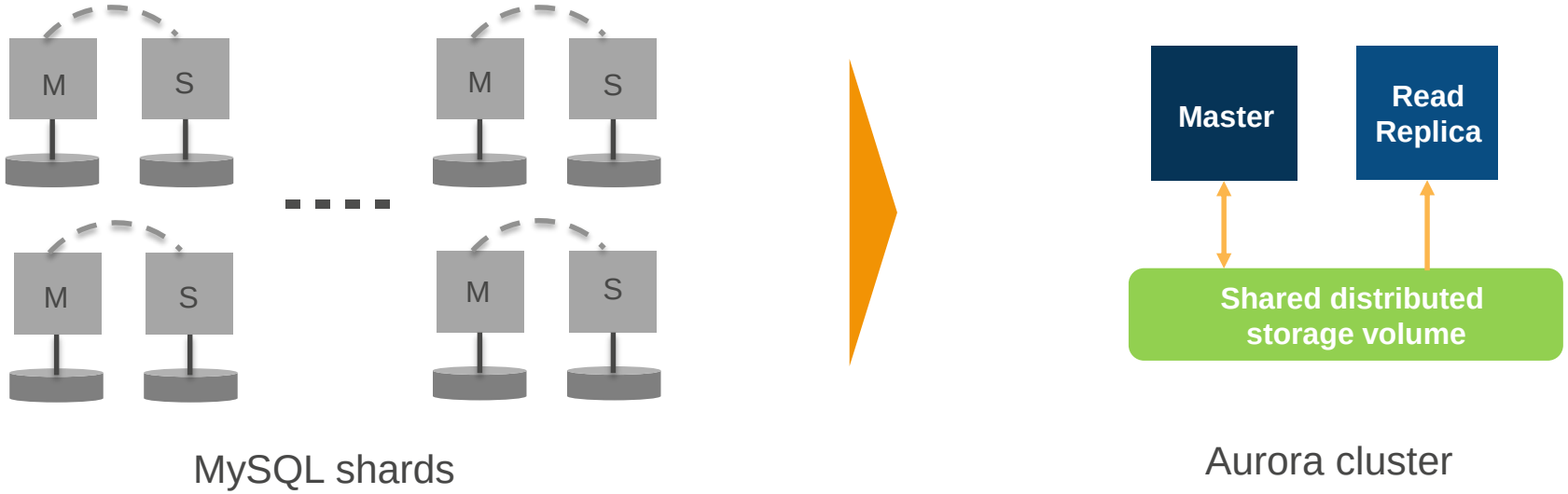
Instance cost:	$2.43 / hr
Storage cost:	$4.43 / hr
Total cost:	**$6.86 / hr**

49.6% Savings

Storage IOPs assumptions:

1. Average IOPs is 50% of Max IOPs
2. 50% savings from shipping logs vs. full pages

Use case: MySQL shard consolidation



MySQL shards

Aurora cluster

Customer, a global SAAS provider, was using hundreds of MySQL shards in order to avoid MySQL performance and connection scalability bottlenecks

- Consolidated multiple 29 MySQL shards to single r3.4xlarge Aurora cluster
- Even after consolidation cluster utilization is still 30% with plenty of headroom to grow.

Amazon Aurora Customers

AWS Database Migration Service

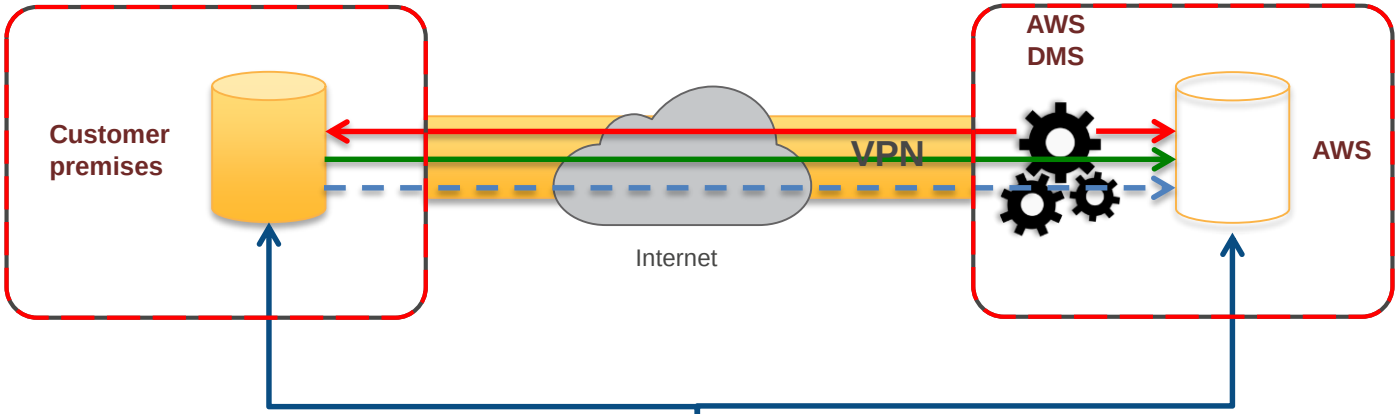
AWS Database Migration Service (AWS DMS)

DMS migrates databases to AWS easily and securely with minimal downtime. It can migrate your data to and from most widely used commercial and open-source databases – and for as little a $3 for TB DB.

PostgreSQL ORACLE Amazon Aurora MariaDB

Amazon Redshift MySQL Microsoft SQL Server SAP ASE

Keep your apps running during the migration



Start a replication instance

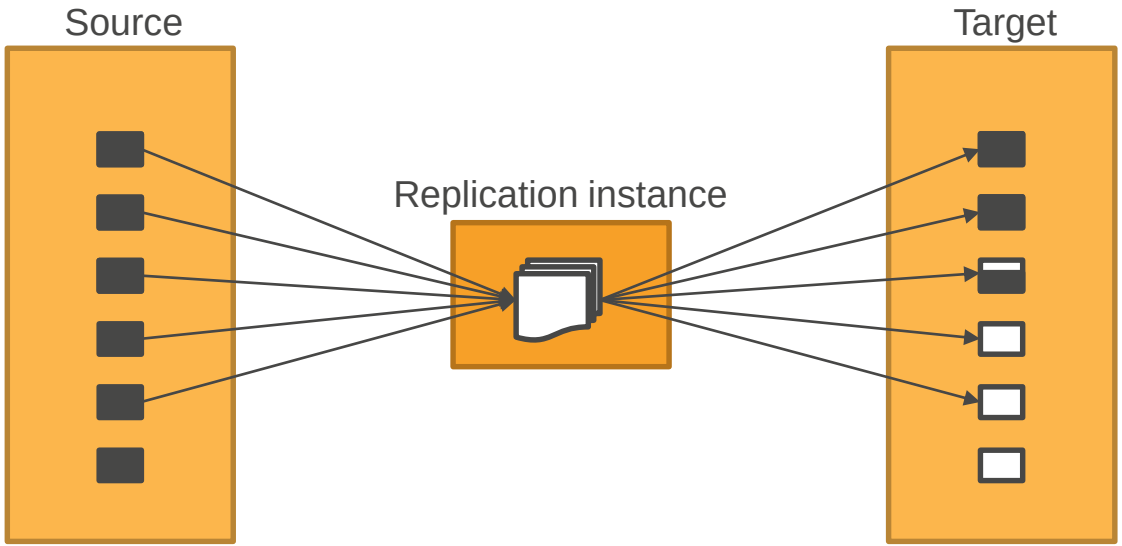
Connect to source and target databases

Select tables, schemas, or databases

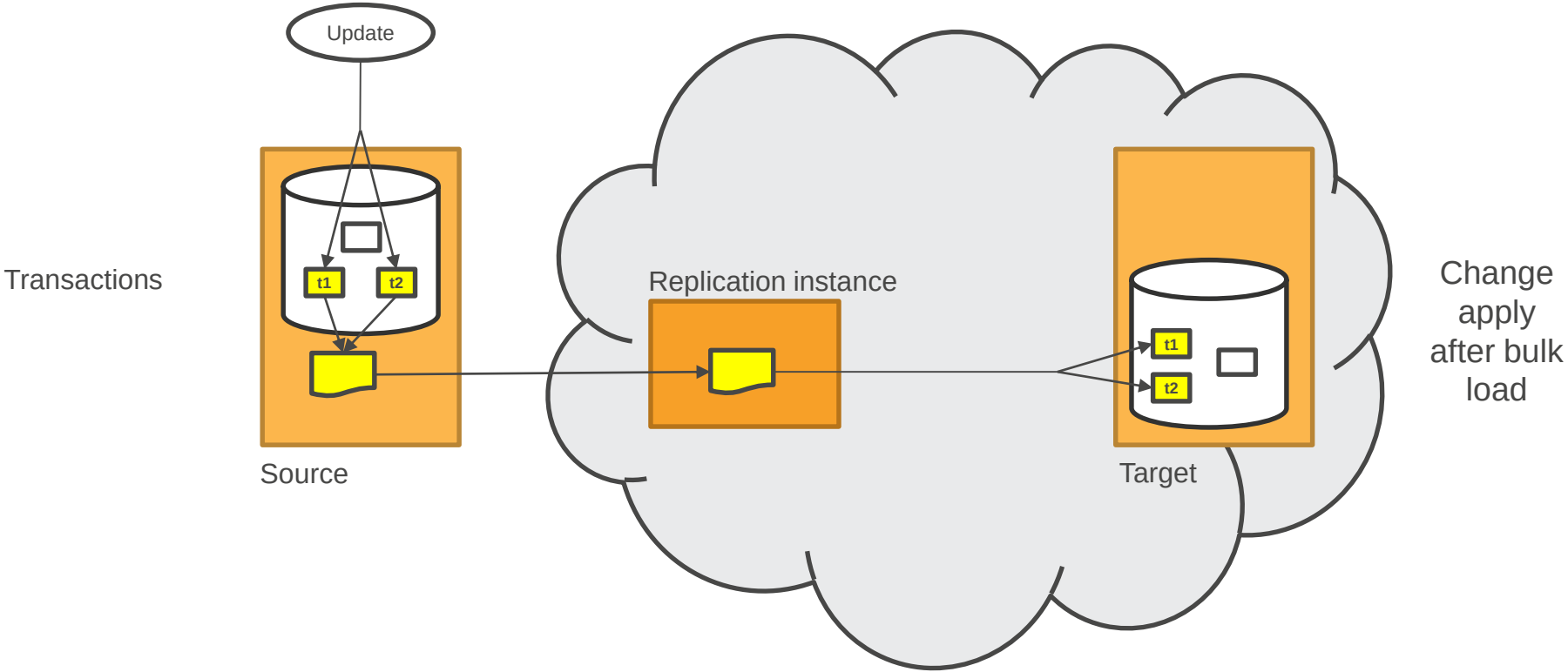
Application users

- Let AWS DMS create tables, load data, and keep them in sync
- Switch applications over to the target at your convenience

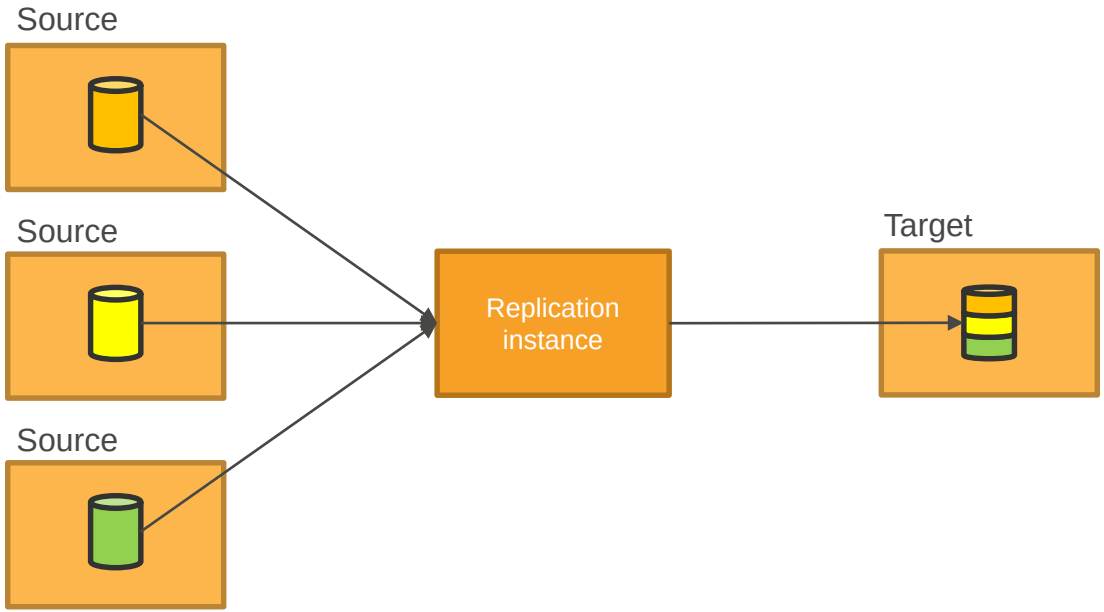
Load is table by table



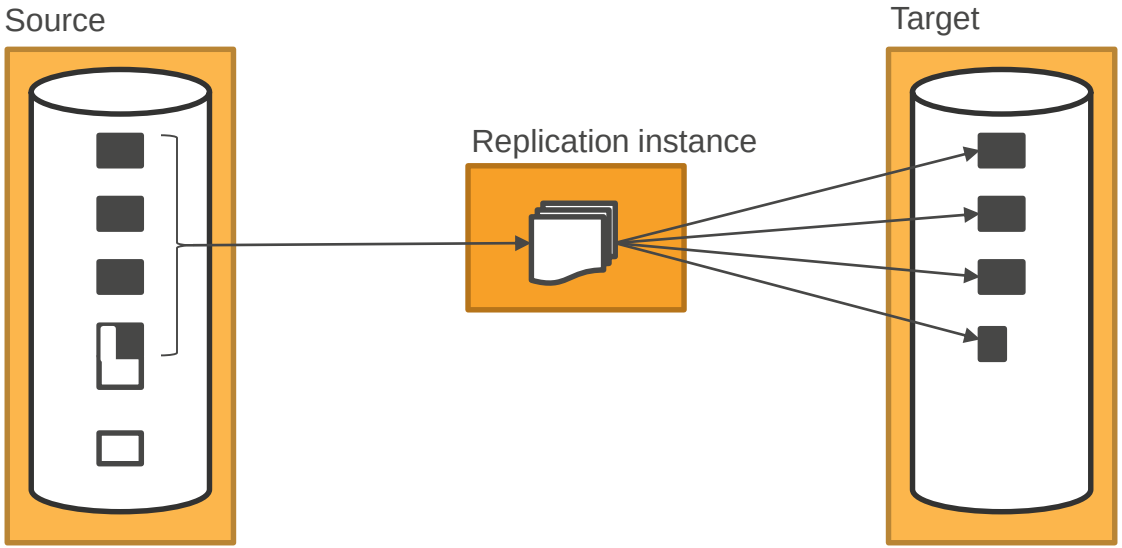
Change data capture (CDC) and apply



What else can I do?



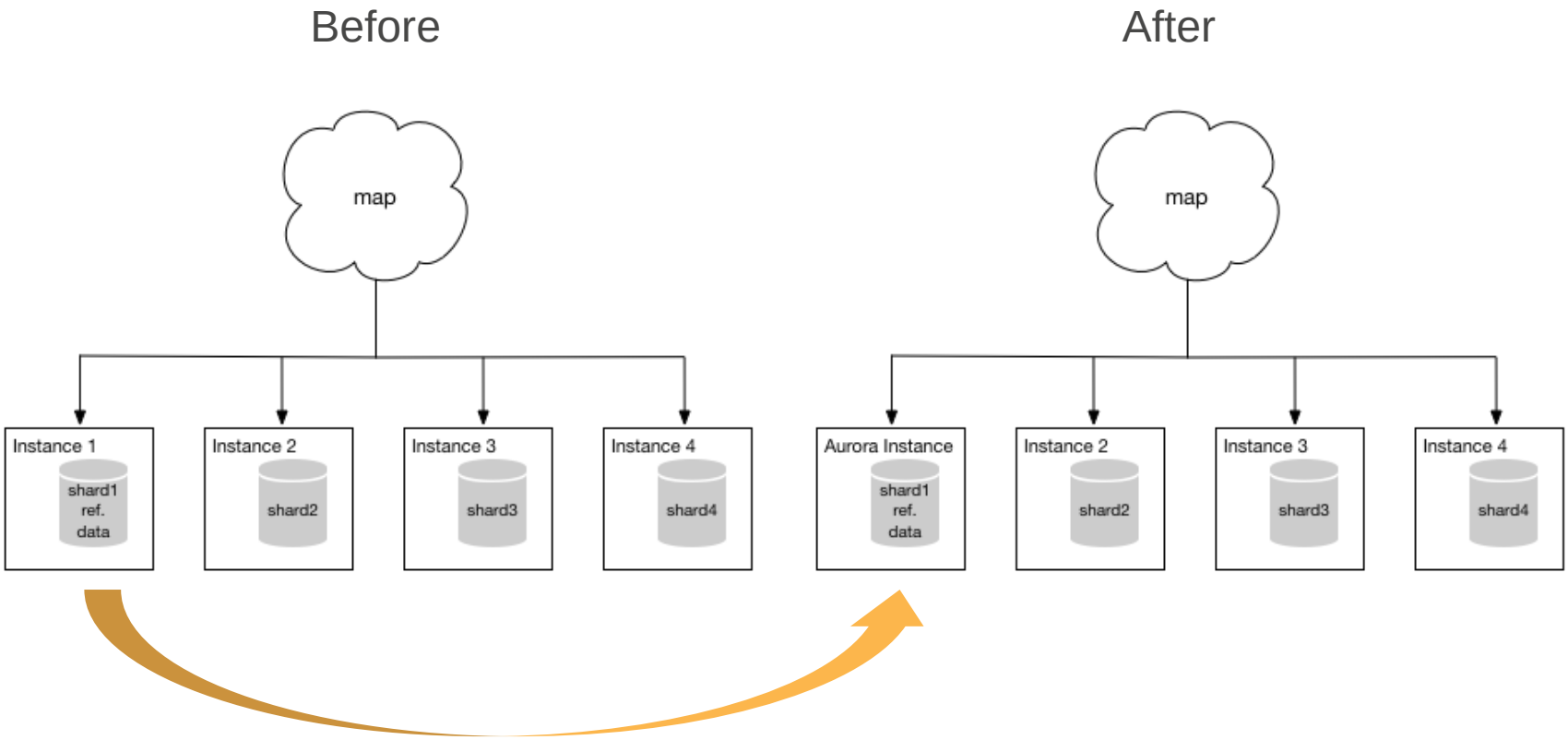
Take it all—or not



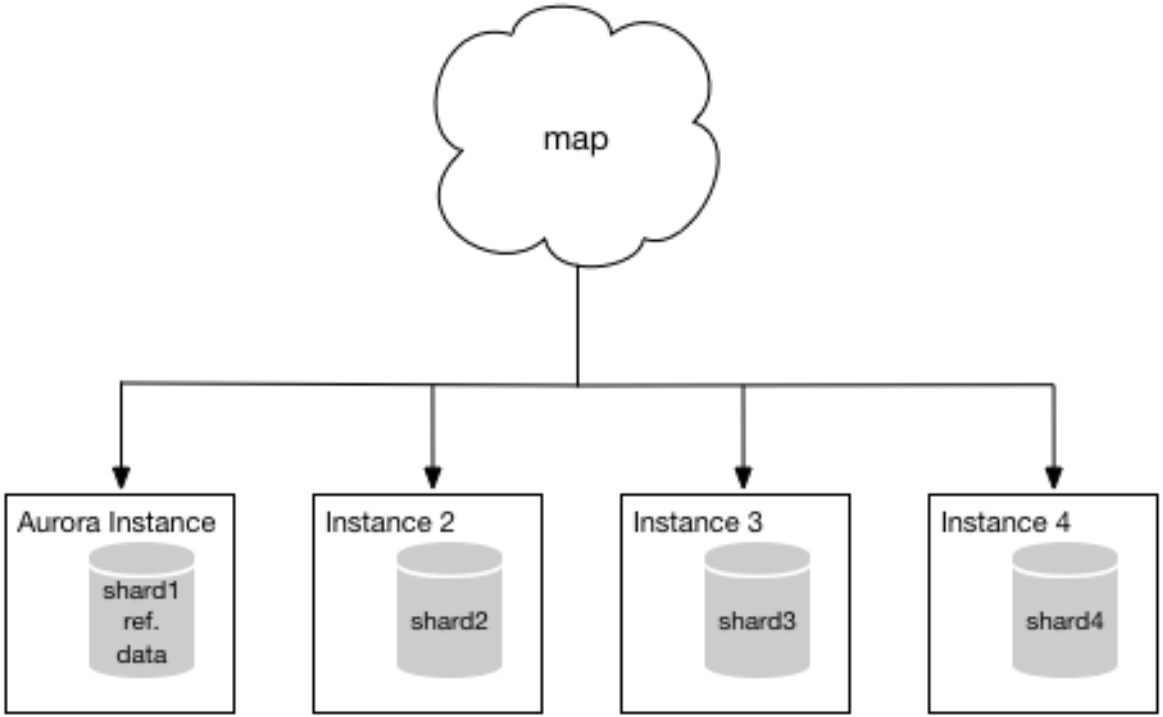
AWS Database Migration Service Customers

Solution

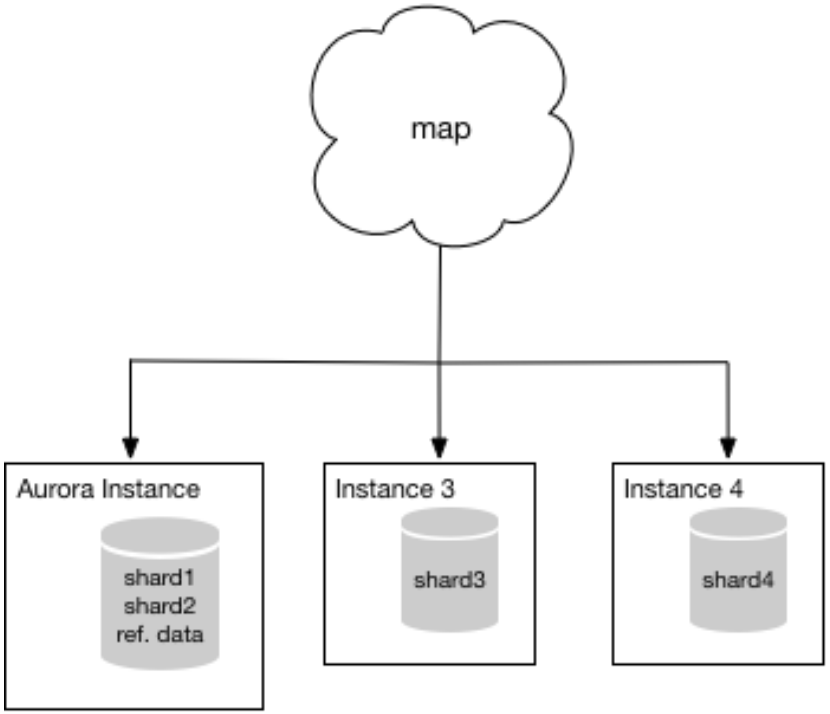
Establish a beach head



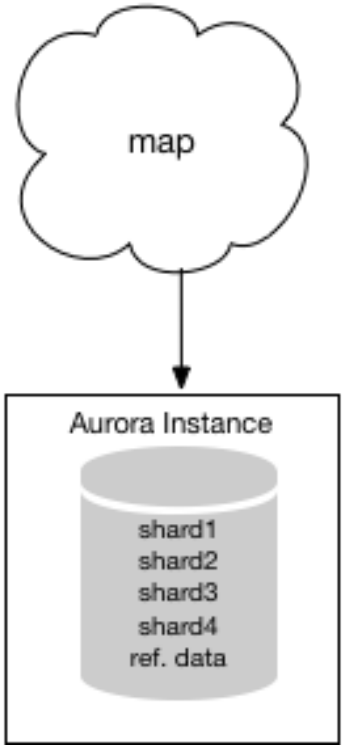
Validate


map
Aurora Instance
shard1
ref.
data
Instance 2
shard2
Instance 3
shard3
Instance 4
shard4

Partial Migration

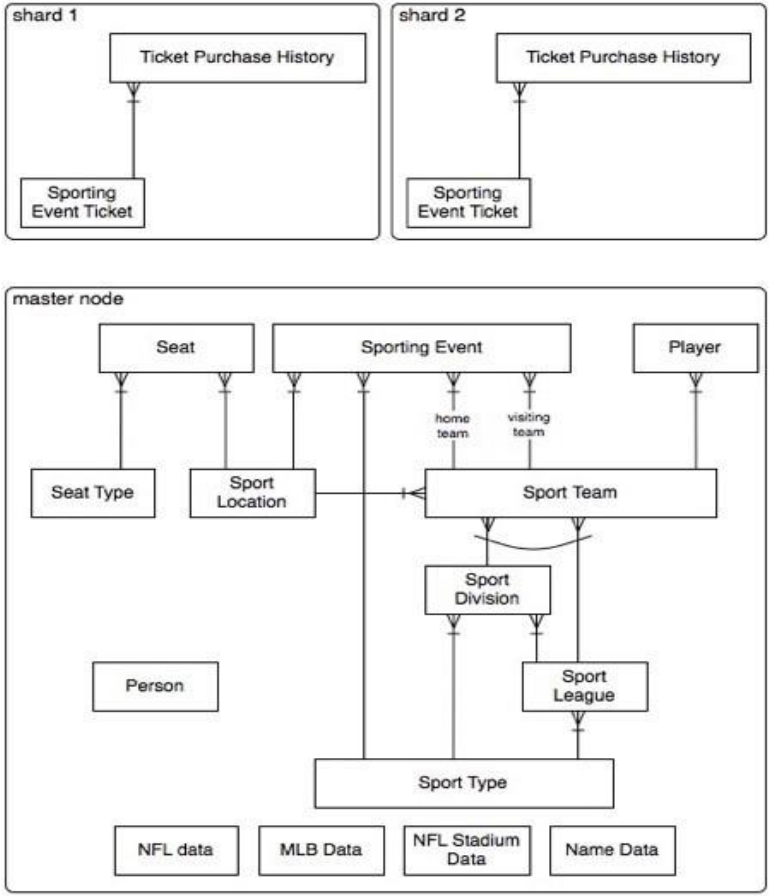


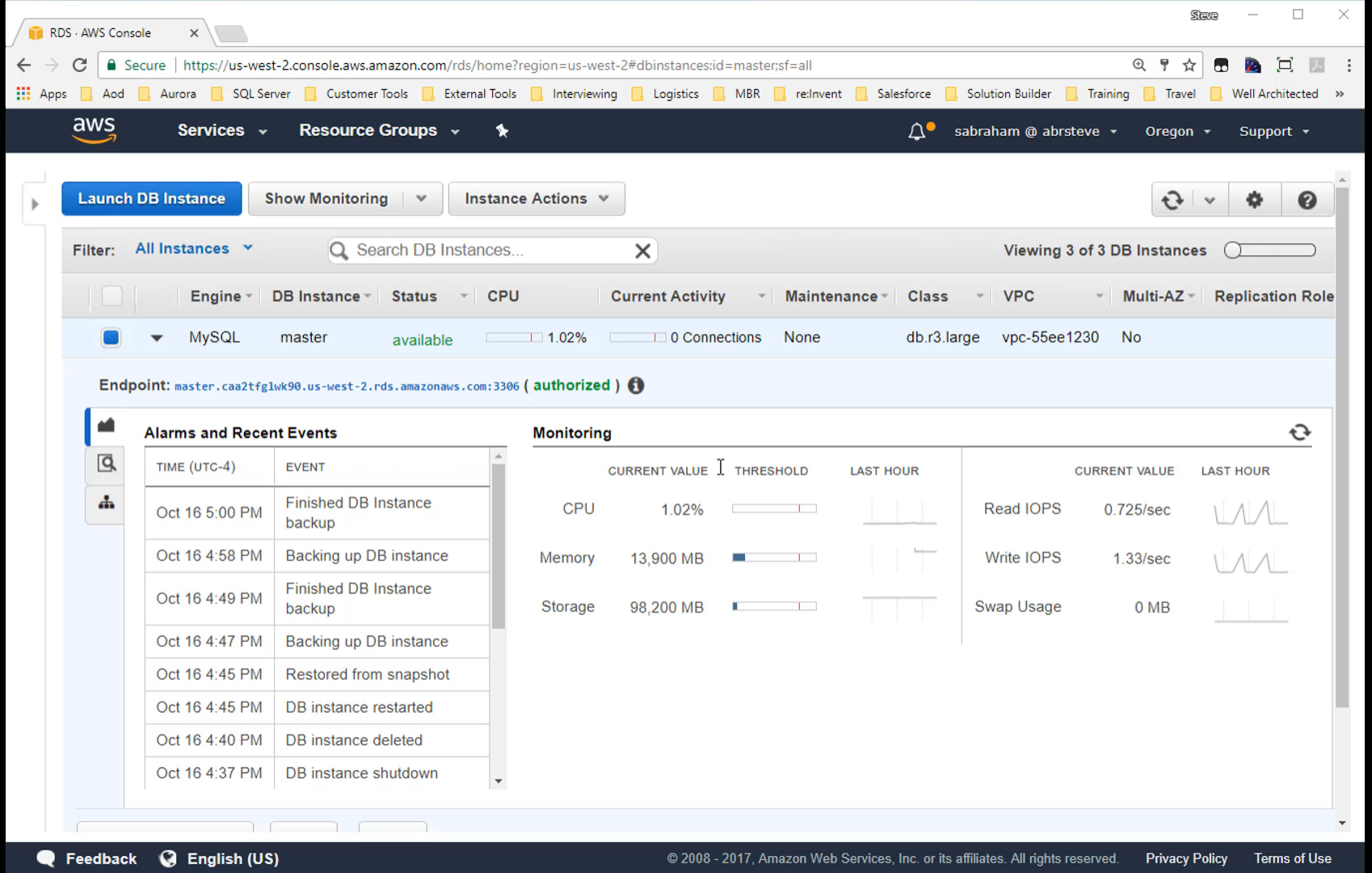
The Result



Demo

Demo Design


shard 1
Ticket Purchase History
Sporting Event Ticket
shard 2
Ticket Purchase History
Sporting Event Ticket
master node
Seat
Sporting Event
Player
home team
visiting team
Seat Type
Sport Location
Sport Team
Sport Division
Person
Sport League
Sport Type
NFL data
MLB Data
NFL Stadium Data
Name Data


RDS - AWS Console
Steve
Secure https://us-west-2.console.aws.amazon.com/rds/home?region=us-west-2#dbinstances:id=master;sf=all
Apps Aod Aurora SQL Server Customer Tools External Tools Interviewing Logistics MBR re:Invent Salesforce Solution Builder Training Travel Well Architected
aws Services Resource Groups sabraham @ abrsteve Oregon Support
Launch DB Instance Show Monitoring Instance Actions
Filter: All Instances Search DB Instances... Viewing 3 of 3 DB Instances
Engine DB Instance Status CPU Current Activity Maintenance Class VPC Multi-AZ Replication Role
MySQL master available 1.02% 0 Connections None db.r3.large vpc-55ee1230 No
Endpoint: master.caa2tfg1wk90.us-west-2.rds.amazonaws.com:3306 (authorized)
Alarms and Recent Events
TIME (UTC-4) EVENT
Oct 16 5:00 PM Finished DB Instance backup
Oct 16 4:58 PM Backing up DB instance
Oct 16 4:49 PM Finished DB Instance backup
Oct 16 4:47 PM Backing up DB instance
Oct 16 4:45 PM Restored from snapshot
Oct 16 4:45 PM DB instance restarted
Oct 16 4:40 PM DB instance deleted
Oct 16 4:37 PM DB instance shutdown
Monitoring
CURRENT VALUE THRESHOLD LAST HOUR
CPU 1.02%
Memory 13,900 MB
Storage 98,200 MB
CURRENT VALUE LAST HOUR
Read IOPS 0.725/sec
Write IOPS 1.33/sec
Swap Usage 0 MB
Feedback English (US)
© 2008 - 2017, Amazon Web Services, Inc. or its affiliates. All rights reserved.
Privacy Policy Terms of Use

Questions?

Learn more..

aws.amazon.com/dms

aws.amazon.com/rds/aurora

Thank you!