

AWS
re:Invent

WIN401-R

Modernize your SQL Server workloads to Amazon Aurora

Julius Sacramento

Solutions Architect
AWS

Nickil Somanna

Solutions Architect
AWS

Agenda

1. Running SQL Server on AWS
2. Migrating to a relational database built for the cloud
 - Amazon Aurora
 - AWS Database Migration Service
 - AWS Schema Conversion Tool (AWS SCT)
3. Hands-on lab

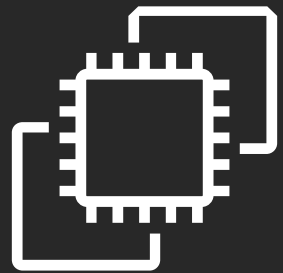
SQL Server on AWS

Running SQL Server on AWS



Amazon Relational Database Service (Amazon RDS)

Managed service with up to 96 vCPU, 488 GB RAM, and 16 TB storage



Amazon Elastic Compute Cloud (Amazon EC2)

Self-managed virtual machine with up to 128 vCPU, 4 TB RAM, and 400 TB storage

Options for Deploying SQL Server on AWS

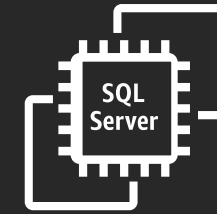


Amazon RDS for SQL Server

- **Consider Amazon RDS first**
- Focus on business value tasks
- High-level tuning
- Schema optimization
- No in-house DB expertise
- Auto host replacement
- Multi-AZ Always On support

Scaling
High Availability
Database Backups
DBMS Patching
DBMS Install/Maintenance
OS Patching
OS Install/Maintenance
Power, HVAC, net

 AWS managed



SQL Server on Amazon EC2

- Need full DB control
- Replication
- Clustering
- Read replicas
- Multi-Region AGs
- Distributed AGs
- Amazon RDS options not available
- SQL component services:
 - *Integration services*
 - *Analysis services*
 - *Reporting services*
 - *Data quality services*
 - *Master data services*

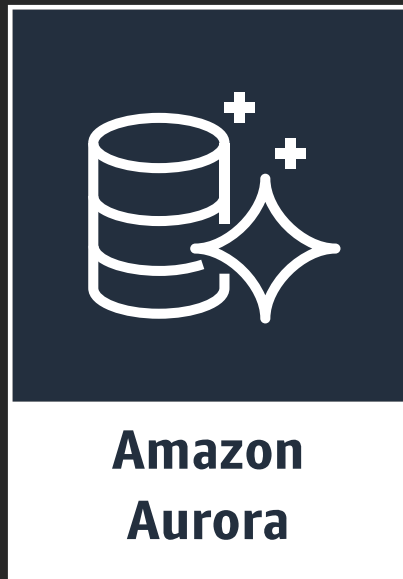
Scaling
High Availability
Database Backups
DBMS Patching
DBMS Install/Maintenance
OS Patching
OS Install/Maintenance
Power, HVAC, net

 Customer managed

Amazon Aurora (MySQL)

Amazon Aurora is . . .

A cloud-native engine



Open-source engines



Commercial engines

Microsoft SQL Server

Oracle

Amazon RDS

- Automatic failover
- Backup & recovery
- X-Region replication
- Isolation & security
- Industry compliance
- Automated patching
- Advanced monitoring
- Routine maintenance
- Push-button scaling

Amazon Aurora: Databases Reimagined for the Cloud

Speed and **availability** of high-end commercial databases

Simplicity and **cost-effectiveness** of open-source databases

Drop-in **compatibility** with MySQL and PostgreSQL

Simple **pay-as-you-go** pricing

Delivered as a **fully managed** service



**Amazon
Aurora**

Scale-out, distributed, multi-tenant design ...

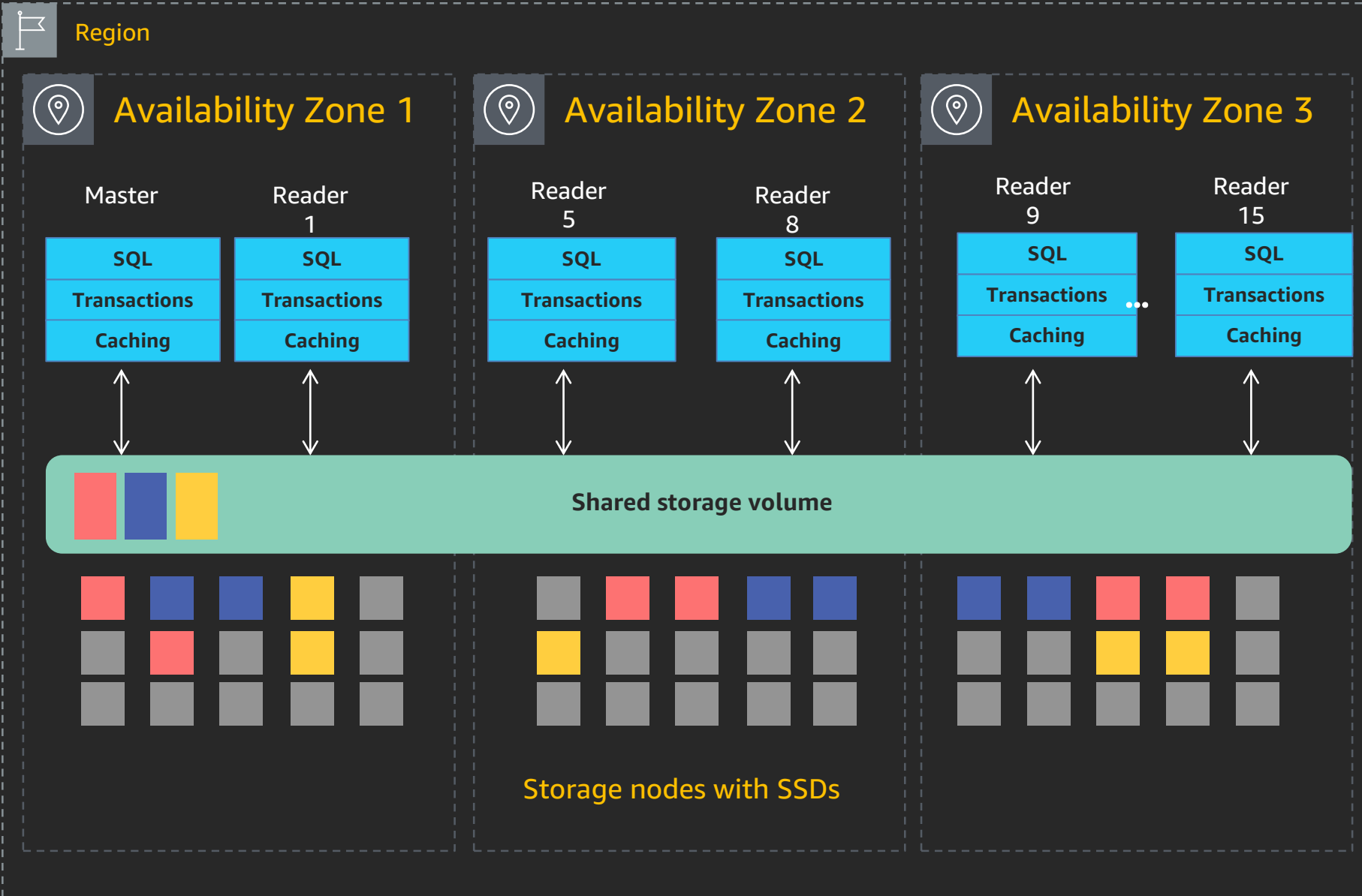
Purpose-built log-structured, distributed storage

10GiB stripes

6-way replication, 2 per AZ

Quorums survive AZ+1 failure

Master and up to 15 readers all point to the same storage

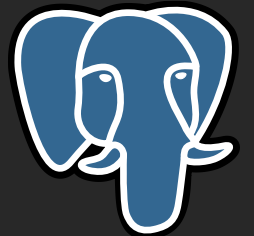


AWS Database Migration Service

AWS Database Migration Service



AWS Database Migration Service



PostgreSQL

Oracle



Amazon Aurora



Amazon Redshift



Microsoft SQL Server

- Start your first migration in 10 minutes or less
- Keep your apps running during the migration
- Replicate within, to, or from Amazon EC2 or Amazon RDS
- Move data to the same or a different database engine

Database Migration Service: Use Cases

- Migration or replication
- Multiple sources
 - Consolidation
- Multiple targets
 - Sharding
 - Reporting
 - Disaster recovery
- Cross engine
 - Same/Same (SQL Server -> SQL Server)
 - Same/Different (SQL Server -> Aurora)

Database Migration Service: Components

- **Replication instances**
 - Basically Amazon EC2 instances are designed and configured with AWS DMS software, managed by AWS
- **Endpoints**
 - Defining the connections used by the replication instances
- **Tasks**
 - Defining the workload of the replication instances

AWS Schema Conversion Tool

AWS Schema Conversion Tool

The AWS Schema Conversion Tool helps automate many database schema and code conversion tasks when migrating from Oracle and SQL Server to open source database engines



Features:

Oracle and SQL Server schema conversion to MySQL/Aurora/MariaDB and PostgreSQL
Database migration assessment report for choosing the best target engine
Code browser that highlights places where manual edits are required

Database Migration Assessment Report

Database Migration Assessment Report

Source Database: RDS_ADMINISTRATION.rds_administration@ec2-54-172-36-60.compute-1.amazonaws.com:8192-ORCL
Oracle Database 12c Enterprise Edition 12.1.0.1.0 (64bit Production)

Executive Summary

We completed the analysis of your Oracle source database and estimate that 91% of the database storage objects and 100% of database code objects can be converted automatically or with minimal changes if you select Amazon Aurora as your migration target. Database storage objects include schemas, tables, columns, constraints, indexes, sequences, synonyms, user define types and types. Database code objects include functions, procedures, packages, triggers, views, materialized views, events, SQL scalar functions, SQL inline functions, SQL table functions, attributes, variables, constants, table types, public types, private types, cursors, exceptions, parameters and other objects. Based on our analysis of SQL syntax elements of your source database schema, we estimate that 99.9% of your entire database schema can be converted automatically to Amazon Aurora. To complete the migration, we recommend 597 conversion action(s) ranging from simple tasks to medium-complexity actions to significant conversion actions.

Database Objects with Conversion Actions for Amazon Aurora

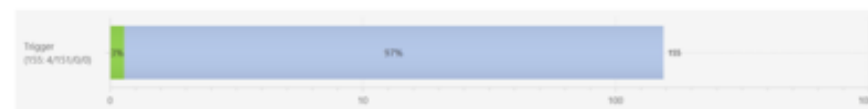
Of the total 1,576 database storage object(s) and 155 database code object(s) in the source database, we were able to identify 1,427 (91%) database storage object(s) and 155 (100%) database code objects that can be converted automatically or with minimal changes to Amazon Aurora.

149 (9%) database storage object(s) required 149 significant user action(s) to complete the conversion.

Figure: Conversion statistics for database storage objects



Figure: Conversion statistics for database code objects



Detailed Recommendations for Amazon Aurora Migrations

If you choose to migrate your Oracle database to Amazon Aurora, we recommend the following actions.

1. Connect to source and target

2. Run assessment report

3. Read executive summary

4. Follow detailed instructions

Database Migration Assessment Report

Source Database: RDS_ADMINISTRATION.rds_administration@ec2-54-172-36-60.compute-1.amazonaws.com:8192-ORCL
Oracle Database 12c Enterprise Edition 12.1.0.1.0 (64bit Production)

Storage Object Actions

Sequence Changes

Some changes are required to sequences that cannot be converted automatically. You'll need to address these issues manually.

Issue 341: MySQL doesn't support sequences

Recommended Action: Try developing a system for sequences in your application.

Issue Code: 341 | No. of Occurrences: 134 | Estimated Complexity: Significant

Schemas.RDS_ADMINISTRATION.Sequences.BACKUP_ID_SEQUENCE
Schemas.RDS_ADMINISTRATION.Sequences.CERTIFICATE_ID_SEQUENCE
Schemas.RDS_ADMINISTRATION.Sequences.CHARACTER_SET_ID_SEQ
Schemas.RDS_ADMINISTRATION.Sequences.CUSTOMER_SUBNET_GROUP_ID_SEQ
Schemas.RDS_ADMINISTRATION.Sequences.CUSTOMER_SUBNET_ID_SEQ
+129 more

Index Changes

Some changes are required to indexes that cannot be converted automatically. You'll need to address these issues manually.

Issue 207: MySQL doesn't support function indexes

Recommended Action: Revise your code and try to use simple index.

Issue Code: 207 | No. of Occurrences: 3 | Estimated Complexity: Significant

Documentation References: <https://dev.mysql.com/doc/refman/5.6/en/create-table.html>

Schemas.RDS_ADMINISTRATION.Tables.DBI_ENGINE_SEEDS.Indexes.I_DBI_ENG_SEED_DBI_ENG_CONF_ID
Schemas.RDS_ADMINISTRATION.Tables.RDS_SYSTEM_ACCOUNTS.Indexes.I_SYS_ACCOUNT_DEFAULT
Schemas.RDS_ADMINISTRATION.Tables.RUNNABLE_DBI_CONFIG.Indexes.U_RNBL_DBI_CFG_PREFERRED

Constraint Changes

Some changes are required to constraints that cannot be converted automatically. You'll need to address these issues manually.

Issue 210: MySQL doesn't support FUNCTION AS DEFAULT VALUE

Recommended Action: Try using a trigger.

Issue Code: 210 | No. of Occurrences: 2 | Estimated Complexity: Simple

Documentation References: <https://dev.mysql.com/doc/refman/5.6/en/create-table.html>

Schemas.RDS_ADMINISTRATION.Tables.CUSTOMERS.Constraints.CK_CUSTOMER_TRUST_LEVEL_STATE: 0:10
Schemas.RDS_ADMINISTRATION.Tables.STORAGE_VOLUMES.Constraints.CK_SV_LIFECYCLE: 0:8

Issue 325: MySQL does not support check constraints. Emulating triggers created

Recommended Action: Please revise generated code and modify it if is necessary.

Issue Code: 325 | No. of Occurrences: 283 | Estimated Complexity: Simple

Documentation References: <https://dev.mysql.com/doc/refman/5.6/en/create-table.html>

Hands-on Lab

Hands-on Lab instructions

<http://mssqlmodernization.awsdocs.net>

Region: US-West-2

Thank you!



Please complete the session survey in the mobile app.