AWS DMS Workshop

Core Concepts

AWS ASEAN Team

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About

This workshop is composed of three parts:

- Part 1: Introduction to core concepts of AWS Database Migration Services (AWS DMS) and the AWS Schema Conversion Tool (AWS SCT)
- Part 2: Lab providing hands-on with a SQL use case, specifically migrating Oracle DB -> Postgres DB
- Part 3: Lab providing hands-on with a NoSQL use case, specifically migrating MongoDB -> Amazon DynamoDB

Agenda

- Challenges of Database Migration
- AWS Database Migration Service (AWS DMS)
- AWS Schema Conversion Tool (AWS SCT)

Challenges of Database Migration

Customers Want to Migrate to AWS, but…

- Migrations create long periods of application downtime
- Migration tools that minimize downtime are expensive
- Migrations seem too complex and expensive, especially across two different platforms
- Migrations still require a copy of data on-premise
- Migrations require skills outside their organization

Traditional Approach to Migrate to AWS

1. Create your AWS account
2. Setup your Virtual Private Cloud (VPC) in AWS
3. Connect to AWS with a VPN or Direct Connect
4. Shutdown and backup your database
5. Transmit the backup to S3
6. Configure an EC2 instance with the DB software
7. Restore the backup
8. Configure EC2 instances for the application
9. Switch the users to use AWS

Traditional Approach to Migrate to AWS

Steps 4-9 could take weeks!

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AWS Database Migration Service (AWS DMS)

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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.

PostgreSQL · ORACLE · Amazon Aurora · MariaDB · Amazon Redshift · MySQL · Microsoft SQL Server · Microsoft SQL Azure · SAP ASE

AWS DMS Support for NoSQL

Migrate to AWS

- Move from MongoDB to Amazon DynamoDB
- Move from MongoDB to relational DBs

DynamoDB

RDS

Move between NoSQL and SQL

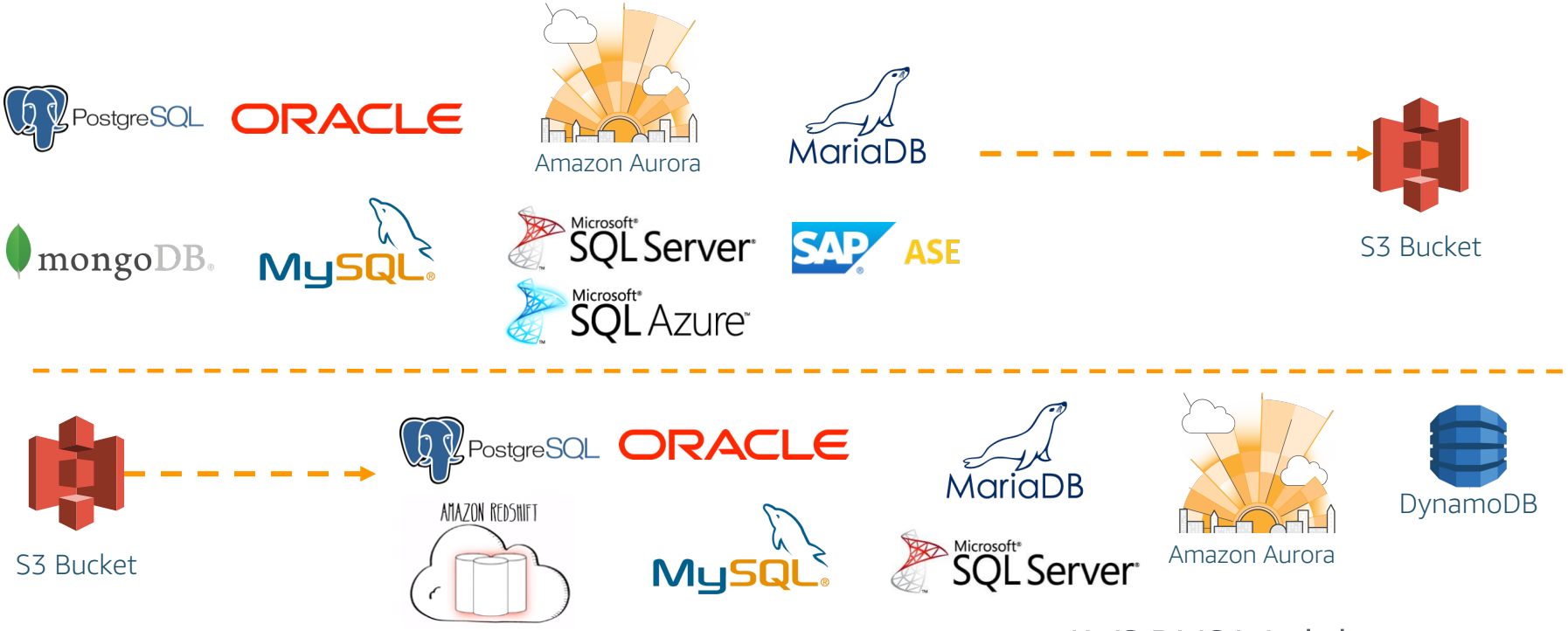
- Re-platform database technology

Amazon Aurora

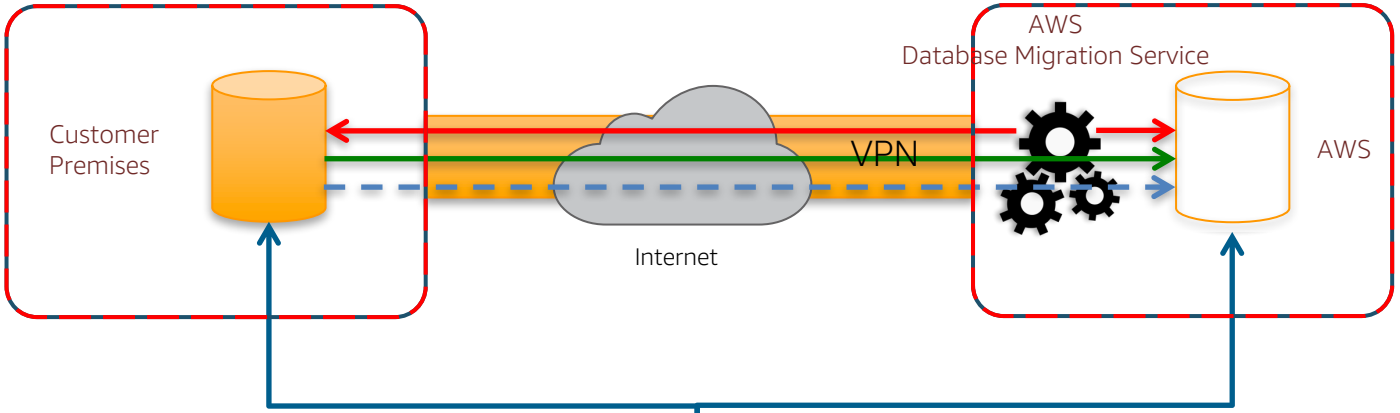
DynamoDB

AWS DMS Support for S3 (as Source or Target)

Extract Data from any supported DMS source to S3 and to any DMS target



Keep Your Apps Running During the Migration



1. Start a replication instance
2. Connect to source and target databases
3. Select tables, schemas, or databases
4. Let AWS DMS create tables, load data, and keep them in sync
5. Switch applications over to the target at your convenience

AWS DMS Key Concepts

- Replication instances are EC2 instances that provide the processing engine for data migrations
- Endpoints are wrappers around the source and target databases, used by the the replication instances during data migration
- Tasks oversee the data migration process, provide source filters and/or data transforms, and determine if data will continue to be replicated after the initial transfer is performed

AWS Schema Conversion Tool (AWS SCT)

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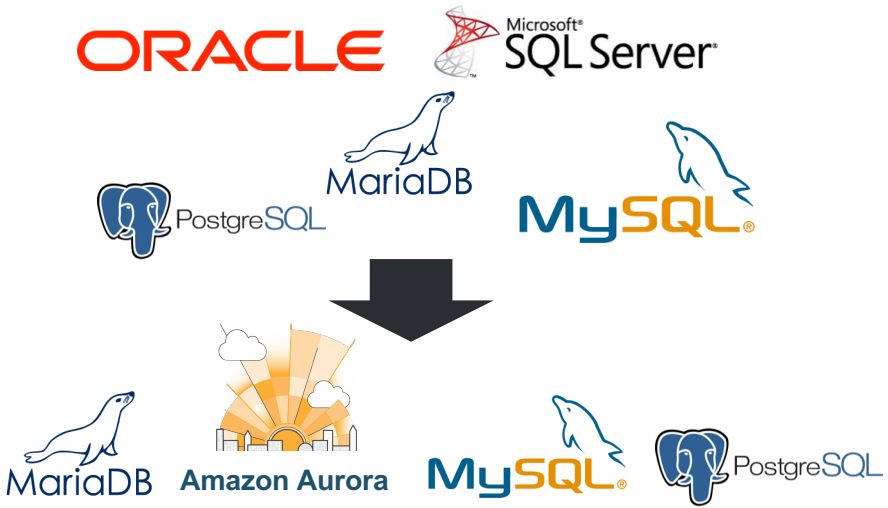
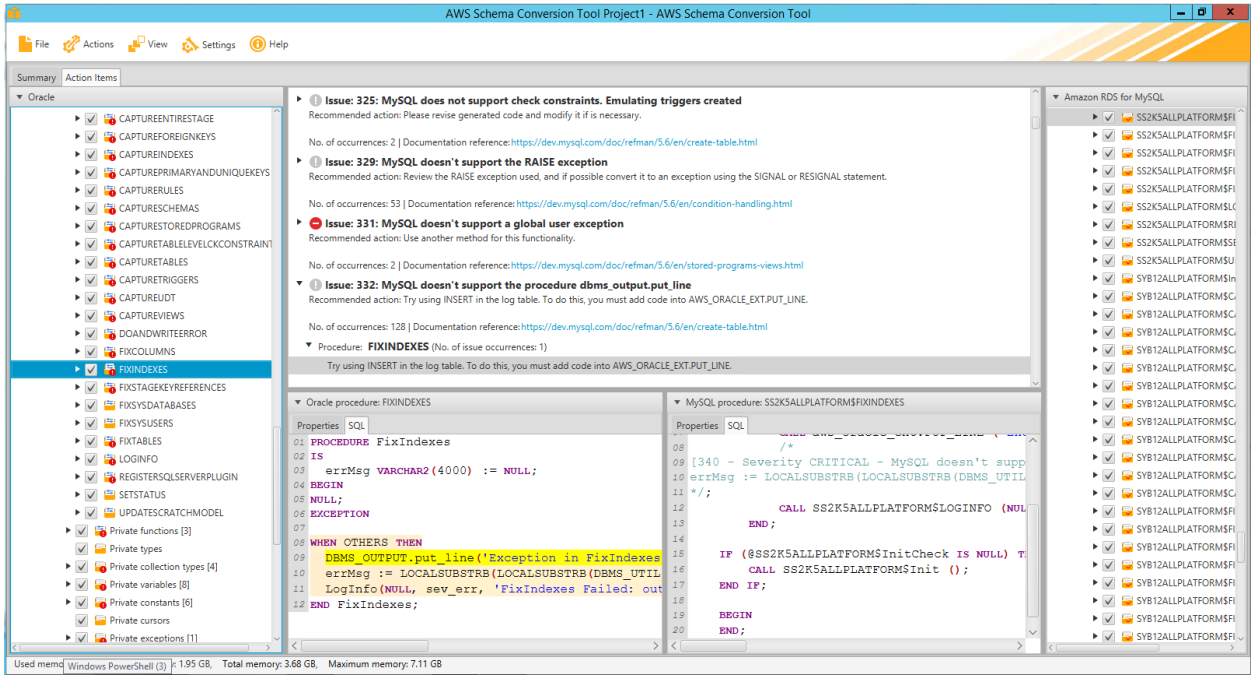
AWS SCT is a desktop application that helps automate many database schema and code conversion tasks when migrating between database engines or data warehouse engines



AWS SCT Helps Convert Tables, Views & Code

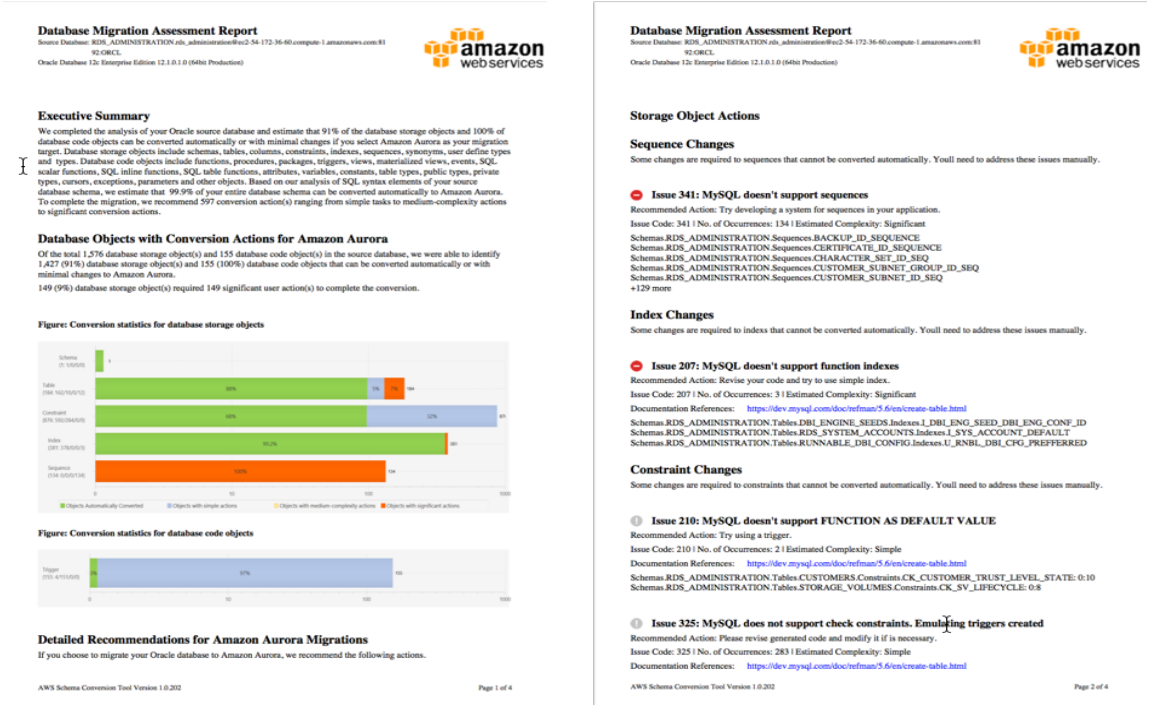


- *Sequences*
- *User-Defined Types*
- *Synonyms*
- *Packages*
- *Stored Procedures*
- *Functions*
- *Triggers*
- *Schemas*
- *Tables*
- *Indexes*
- *Views*
- *Sort and distribution keys*

AWS SCT Assessment Report

AWS SCT provides an Assessment Report to help you plan for any potential conflicts in your planned migration

1. Connect AWS SCT to Source and Target DBs
2. Run Assessment Report
3. Read Executive Summary
4. Follow detailed guidance



Database Migration Assessment Report

Source Database: RDS_ADMINISTRATION.rds_administration@oc2-54-172-36-60.compute-1.amazonaws.com:8192:ORCL

Oracle Database 12c Enterprise Edition 12.1.0.1.0 (64bit Production)

amazon web services

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.

AWS Schema Conversion Tool Version 1.0.202 Page 1 of 4

Database Migration Assessment Report

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Storage Object Actions

Sequence Changes

Some changes are required to sequences that cannot be converted automatically. Youll 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 indexs that cannot be converted automatically. Youll 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_PREFFERRED

Constraint Changes

Some changes are required to constraints that cannot be converted automatically. Youll 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

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Database Migration Assessment Report (Sample)

AWS SCT Pricing and Permitted Use

$0

for software license

Pricing

- Free software license
- For active AWS customers with accounts in good standing

Permitted Use

- Use AWS SCT to migrate database schemas to Amazon RDS, Amazon Redshift, or Amazon EC2-based databases
- To use AWS SCT to migrate schemas to other destinations, contact for special pricing

Next:
SQL Lab: Oracle to PostgreSQL

aws