

“Expert Cloud Consulting” -

Database Migration

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Database Migration

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2.0 General Information:

2.1 Document / GitHub URL(s)

Ticket(s) Name	URL
Database Migration	...

2.2 Document Purpose

This technical documentation outlines the complete process of migrating an Azure SQL database to an AWS RDS SQL Server instance using AWS Data Migration Service (DMS), including the setup, execution, and best practices.

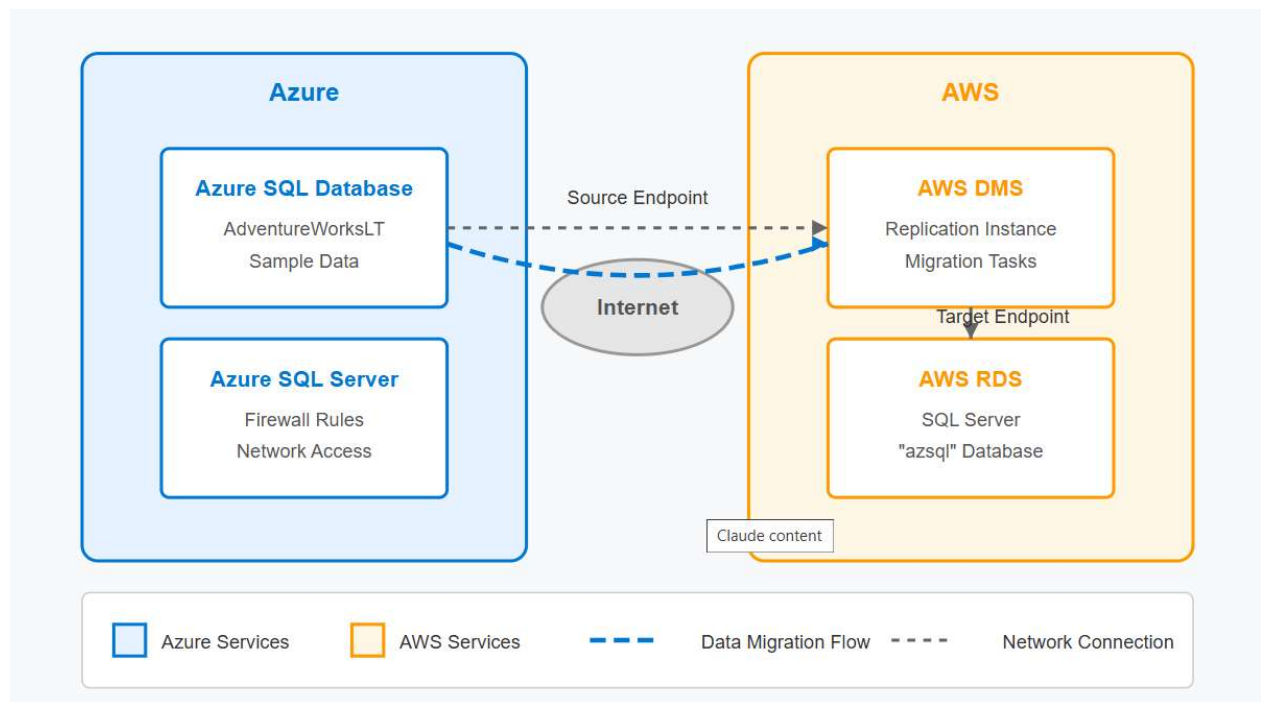
2.3 Document Revisions

Date	Version	Contributor(s)	Approver(s)	Section(s)	Change(s)
20/02/25	1.0	Prasad Bandagale	In Review	All Sections	New Document Created

2.4 Document References

Date	Document	Filename / URL
2024	AWS DMS Documentation	https://docs.aws.amazon.com/dms/
2024	Azure SQL Database	https://docs.microsoft.com/en-us/azure/azure-sql/
2024	AWS RDS for SQL Server	https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_SQLServer.html

3.0 Infrastructure Overview



3.1 Source Environment (Azure SQL)

- Azure SQL single database instance
- Sample database: AZ2AWS
- Features utilized:
 - Built-in backup and recovery
 - Encryption settings
 - Network configuration

3.2 Target Environment (AWS RDS)

- Amazon RDS for SQL Server instance
 - Engine: Microsoft SQL Server
 - Instance size: [t3.micro]
 - Storage: [20 GB]
- Empty database created: "migrateddatabase"
- Security groups and network configuration

3.2 Migration Architecture

- AWS Data Migration Service (DMS) serves as the migration tool
- Replication instance handles data movement

- Source and target endpoints connect to respective databases
- Full data load migration type selected

4.0 Migration Components

4.1 AWS Data Migration Service (DMS)

- Replication Instance
 - Handles the migration process
 - Instance class affects performance
 - Requires network connectivity to both source and target
- Endpoints
 - Source endpoint connects to Azure SQL
 - Target endpoint connects to AWS RDS
 - Security and authentication configuration required
- Database Migration Tasks
 - Controls what data is migrated
 - Defines how the migration occurs
 - Provides validation capabilities

4.2 AWS Schema Conversion Tool (SCT)

- Not required for this migration as both source and target use SQL Server
- Useful for heterogeneous migrations (e.g., SQL Server to PostgreSQL)
- Can be used for complex schema transformations

5.0 Migration Process

5.1 Pre-migration Phase

5.2 Setup Phase

Step 1: Create Azure SQL Single Database Instance

1. Azure SQL Database Setup
 - Selected AdventureWorksLT sample database
 - Configured network access
 - Verified connectivity

Home > Azure SQL > Select SQL deployment option >

Create SQL Database

Microsoft

Apply offer

SQL Database Hyperscale: Low price, high scalability, and best feature set. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Resource group * [Create new](#)

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name *

Server * [Create new](#)

Want to use SQL elastic pool? ☐ Yes ☒ No

[Review + create](#) [Next : Networking >](#)

2. Firewall Configuration

- Added AWS DMS replication instance's public IP to Azure SQL firewall rules
- Verified connectivity from external networks
- Ensured proper security measures

Rule	Virtual network	Subnet	Address range	Endpoint status	Resource group	Subscription	State
<p>Firewall rules</p> <p>Allow certain public internet IP addresses to access your resource. Learn more</p> <p>+ Add your client IPv4 address (182.156.140.38) + Add a firewall rule</p>							
Rule name	Start IPv4 address		End IPv4 address				
ClientIp-2025-2-25_14-25-10	182.156.140.38		182.156.140.38				

Step 2: Create Amazon RDS for SQL Server Instance

1. Instance Creation

- Selected SQL Server engine version
- Configured basic settings

Creating database mirgatedatabase
Your database might take a few minutes to launch. You can use settings from mirgatedatabase to simplify configuration of suggested database add-ons while we finish creating your DB for you. [View credential details](#)

mirgatedatabase [Modify](#) [Actions](#)

Summary				
DB Identifier mirgatedatabase	Status Creating	Role Instance	Engine SQL Server Express Edition	Recommendations
CPU -	Class db.t3.micro	Current activity	Region & AZ -	

Connectivity & security | Monitoring | Logs & events | Configuration | Maintenance & backups | Tags | Recommendations

Endpoint & port

Endpoint
-

Port
-

Networking

Availability Zone
-

VPC
vpc-0c2e46a5f9a29472

Subnet group
default-vpc-0c2e46a5f9a29472

Subnets
subnet-0d1bca45d3755c3f4
subnet-02b8741aa72b9c70d
subnet-0285950a47229c516
subnet-0c725f006b2680a1a
subnet-0b8a6c56a46ac9abb

Security

VPC security groups
default [sg-09d3b877de83f9a28]
Active

Publicly accessible
Yes

Certificate authority [info](#)
rds-ca-rsa2048-g1

Certificate authority date
May 26, 2061, 05:04 (UTC+05:30)

2. Security Configuration

- Used "admin" as username (for testing only)
- Set strong password
- Configured VPC security groups

Edit inbound rules [info](#)
Inbound rules control the incoming traffic that's allowed to reach the instance.

Security group rule ID	Type	Protocol	Port range	Source	Description - optional	
sg-r-0d14a47ee0bbc2a06	MSSQL	TCP	1433	Custom		Delete

[Add rule](#)

Rules with source of 0.0.0.0/0 or ::/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

[Cancel](#) [Preview changes](#) [Save rules](#)

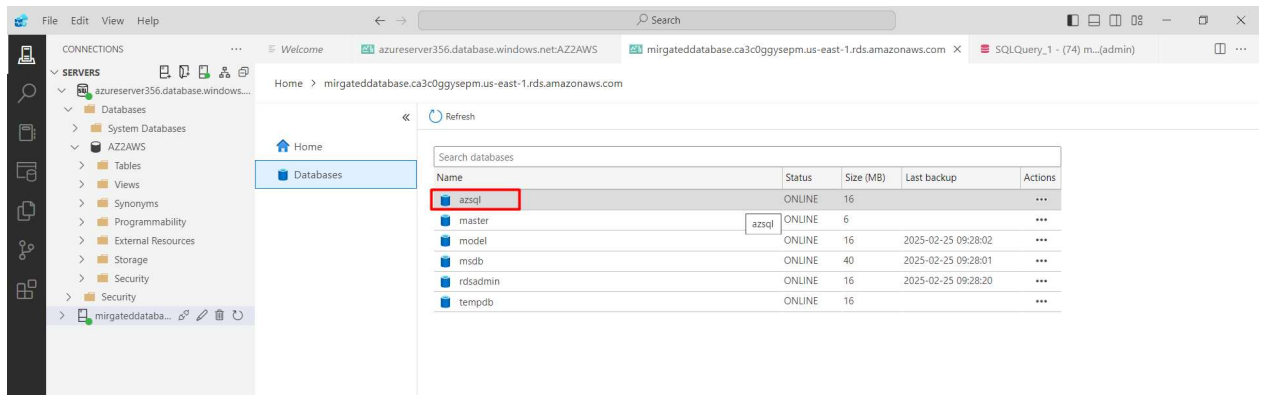
3. Empty Database Creation

Empty Database Creation

- Connected to RDS instance using SSMS
- Created "azsql" empty database
- Verified database creation

SSMS Connection Details:

- Server type: Database Engine
- Server name: [endpoint],[port]
- Authentication: SQL Server Authentication
- Login: [Master username]
- Password: [Master password]



Step 3: Create AWS DMS Replication Instance

1. Replication Instance Setup

- Selected appropriate instance class based on workload
- Configured VPC and subnet settings
- Set up security groups for network access

[DMS](#) > [Replication instances](#) > Create replication instance

Create replication instance [Info](#)

Configuration best practices
Click [View details](#) button to review configuration best practices. [View details](#)

Settings

Name
The name must be unique among all of your replication instances in the current AWS region.

Replication instance name must start with a numeric value

Descriptive Amazon Resource Name (ARN) - optional
A friendly name to override the default DMS ARN. You cannot modify it after creation.

Description - optional

The description must only have unicode letters, digits, whitespace, or one of these symbols: _/+-@. 1000 maximum character.

Instance configuration [Info](#)

Instance class [Info](#)

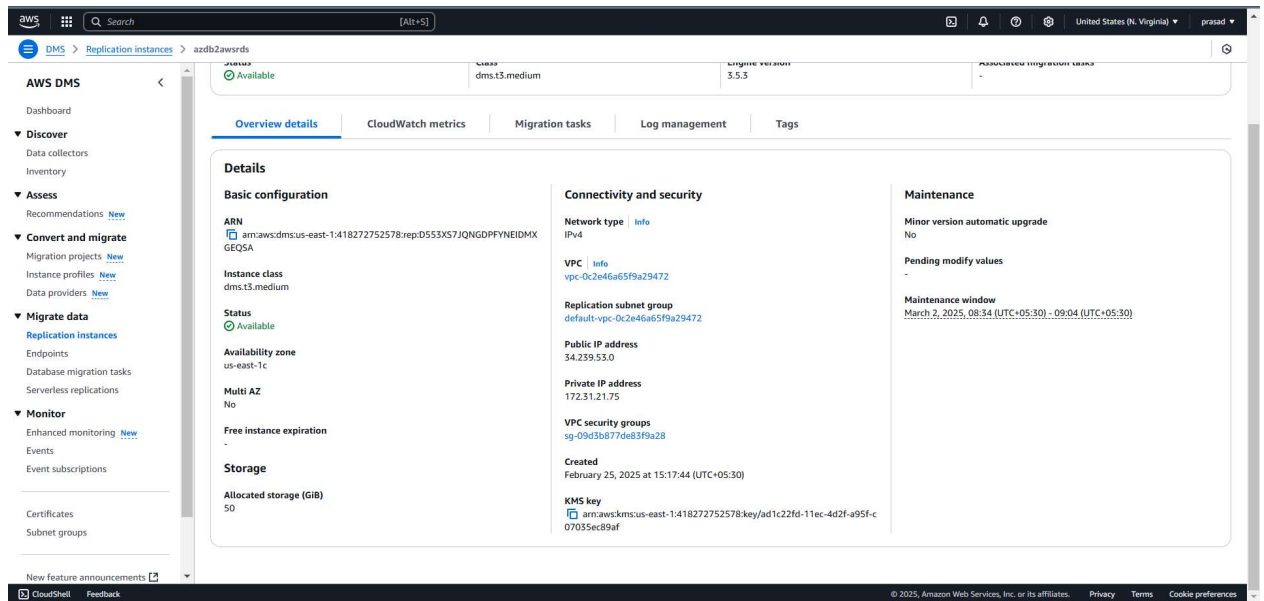
2 vCPUs - 4 GiB Memory

☐ Include previous-generation instance classes

Engine version
Choose an AWS DMS version to run on your replication instance. For more details, see the [AWS DMS release notes](#). For information about DMS version support, see [AWS DMS support lifecycle policy](#).

2. Network Configuration

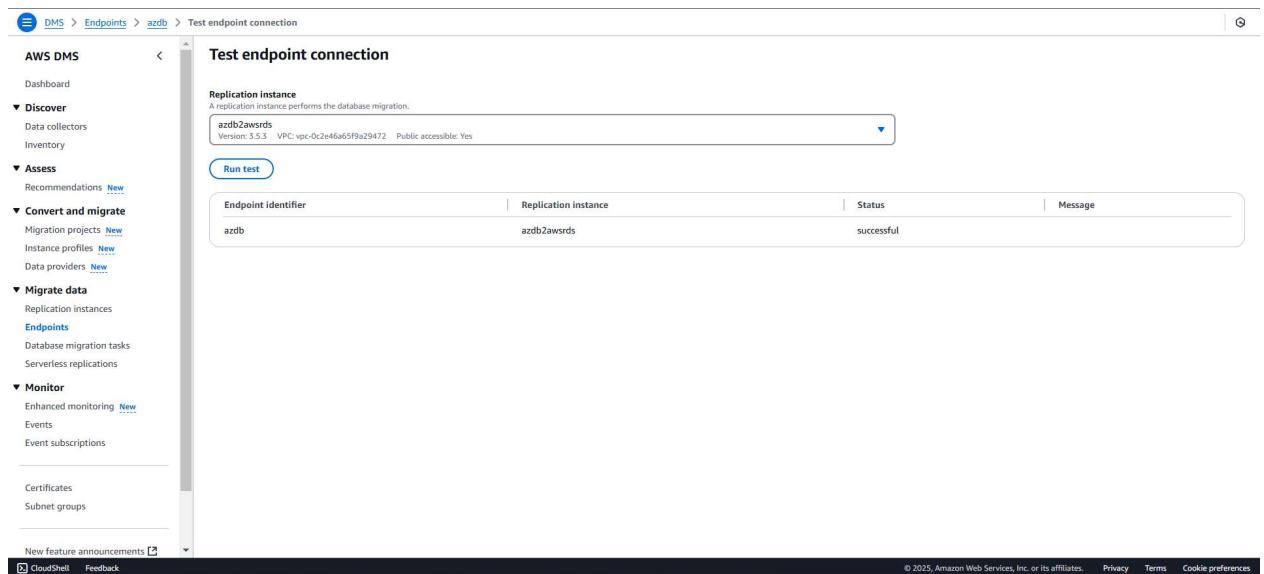
- Ensured connectivity to both Azure SQL and AWS RDS
- Configured security groups to allow traffic
- Verified network paths



Step 4: Create Database Migration Tasks

1. Source Endpoint Creation

- Connected to Azure SQL database
- Configured authentication
- Tested endpoint connectivity



2. Target Endpoint Creation

- Connected to AWS RDS SQL Server
- Configured authentication
- Tested endpoint connectivity

aws

DMS > Endpoints > Create endpoint

Create endpoint [Info](#)

Endpoint type [Info](#)

☐ Source endpoint
A source endpoint allows AWS DMS to read data from a database (on-premises or in the cloud), or from other data source such as Amazon S3.

☒ Target endpoint
A target endpoint allows AWS DMS to write data to a database, or to other data stores such as Amazon DynamoDB or Kinesis.

☒ Select RDS DB instance
Choose this option if the endpoint is an Amazon RDS DB instance. It provides a list of available RDS Instances from the current region.

RDS Instance
Instances available only for current user and region

mirgateddatabase

Endpoint configuration

Endpoint identifier [Info](#)
A label for the endpoint to help you identify it.

mirgateddatabase

Descriptive Amazon Resource Name (ARN) - optional
A friendly name to override the default DMS ARN. You cannot modify it after creation.

Friendly-ARN-name

Target engine
The type of database engine this endpoint is connected to. [Learn more](#)

Microsoft SQL Server

Access to endpoint database [Info](#)

☐ AWS Secrets Manager
Use secrets defined in AWS Secrets Manager to secretly provide your credentials.

Check the connection.

▼ **Test endpoint connection - optional**
Choose the replication instance to test the network and database connectivity for migration.

Replication instance
A replication instance performs the database migration.

azdb2awsrds
Version: 3.5.3 VPC: vpc-0c2e46a65f9a29472 Public accessible: Yes

⚠ **Your endpoint will always be created even if the connection fails**

After clicking 'Run test', DMS creates the endpoint with the details you provided and attempts to connect to it. If the connection fails, you can edit the endpoint definition and test the connection again. You can also delete the endpoint manually.

Run test

Endpoint identifier	Replication instance	Status	Message
mirgateddatabase	azdb2awsrds	successful	

Back

Migration Task Configuration

- Selected "Migrate existing data" migration type
- Chose "Do Nothing" for target table preparation mode
- Enabled validation for data integrity checks.
- Configured premigration assessment.

aws

Q dms

X

DMS

Database migration tasks

Create database migration task

Create database migration task info

Task configuration

Task identifier

Descriptive Amazon Resource Name (ARN) - optional
A friendly name to override the default DMS ARN. You cannot modify it after creation.

Replication instance

Source database endpoint

Target database endpoint

Migration type info

☒ **Migrate**
Migrate data from source to target once

☐ **Migrate and replicate**
Migrate data from source to target once and continue to replicate changes

☐ **Replicate**
Migrate data from source to target from now, or at specified milestone

Task settings

Editing mode info

☒ **Wizard**
You can enter only a subset of the available task settings.

☐ **JSON editor**
You can enter all available task settings directly in JSON format

DMS

Database migration tasks

Create database migration task

Target table preparation mode info

☒ **Do nothing**

☐ Drop tables on target

☐ Truncate

LOB column settings info

☐ Don't include LOB columns

☐ Full LOB mode

☒ Limited LOB mode

Maximum LOB size (KB)

Data Validation info

☒ **Turn off**
Don't validate data for the table in migration task.

☐ **Validation with data migration**
Choose this setting if you want AWS DMS to compare the data at the source and the target immediately after it performs a full data load. Validation ensures that DMS migrated your data accurately, but it requires additional time to complete.

☐ **Validation without data migration**
Choose this setting if you want your task to perform data validation without performing any migration or replication of data. You must set **Target table preparation mode** to **Do nothing**. This setting can only apply to **Migrate existing data (Full Load)** or **Replicate ongoing changes (CDC)** tasks. You can't modify the validation-only setting after you create the task.

Task logs info

☐ **Turn on CloudWatch logs**
DMS task logging uses Amazon CloudWatch to log information during the migration process. You can change the component activities logged and the amount of information logged for each one.

Premigration assessment info

A premigration assessment warns you of potential migration issues before starting your migration task. Premigration assessments generally have minimal impact on your databases and take minimal time to run.

🔔 **Premigration assessment is on by default**
Note that DMS enables premigration assessments by default when you create a migration task. Premigration assessments allow you to identify potential issues with the migration before starting the migration. You can still turn off the premigration assessments if you don't want to use them. [Learn more](#)

☒ **Turn on premigration assessment**
Choose this setting if you want AWS DMS to identify potential issues with the migration before starting the migration. Available only if replication instance, source, and target database are specified. After the current migration task is created, you can go to the Premigration assessments tab in the migration task details page to view assessment results or create a new assessment run with different settings.

Premigration assessment run name
Enter a friendly name to help you find your assessment run.

Must begin with a letter; must contain only ASCII letters, digits, and hyphens; can't end with a hyphen or contain two consecutive hyphens.

S3 bucket for assessment report storage
Amazon S3 bucket or bucket folder that stores the assessment result report.

🔔 **The AWS DMS Schema conversion requires Amazon S3 buckets with default encryption settings only.** To proceed with schema conversion use S3 buckets with AWS-managed encryption keys. Avoid using buckets encrypted with custom AWS Key Management Service (KMS) keys. [Learn more](#)

IAM role for S3 bucket
IAM role that grants DMS permissions to read and write to the specified S3 bucket.

☒ **Create and use a new IAM role**
DMS will create a new IAM role with the name you entered.

☐ **Use an existing IAM role**
Choose an existing IAM role that you've created.

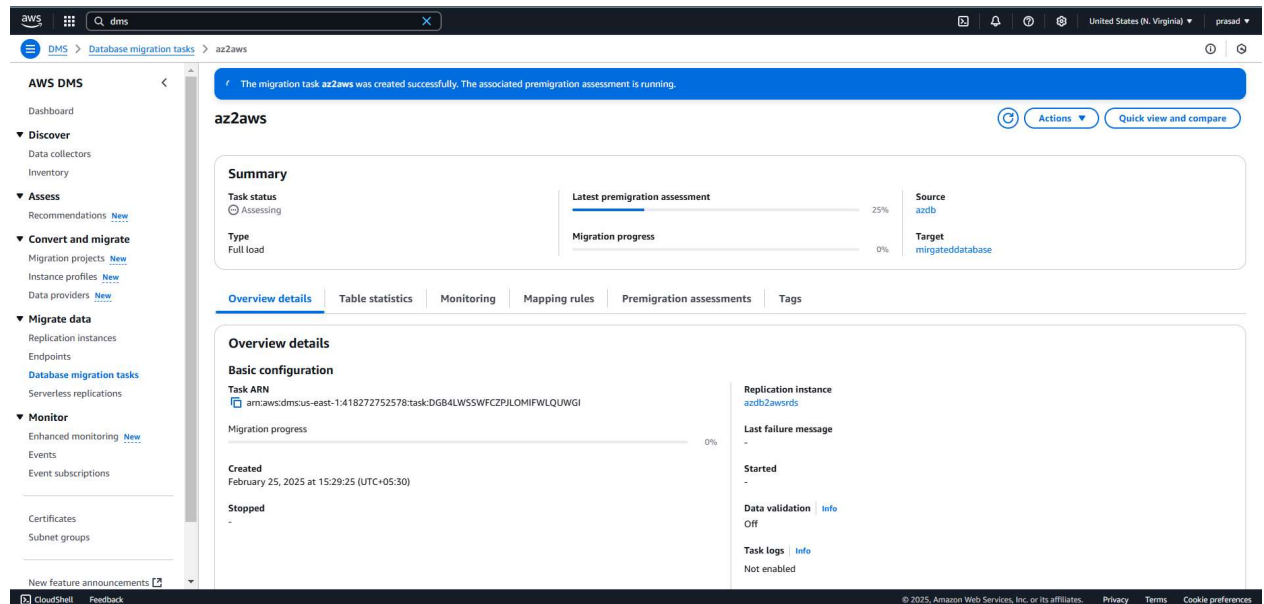
IAM role name
Enter the name for your IAM role.

5.3 Migration Execution

Step 5: Perform Database Migration

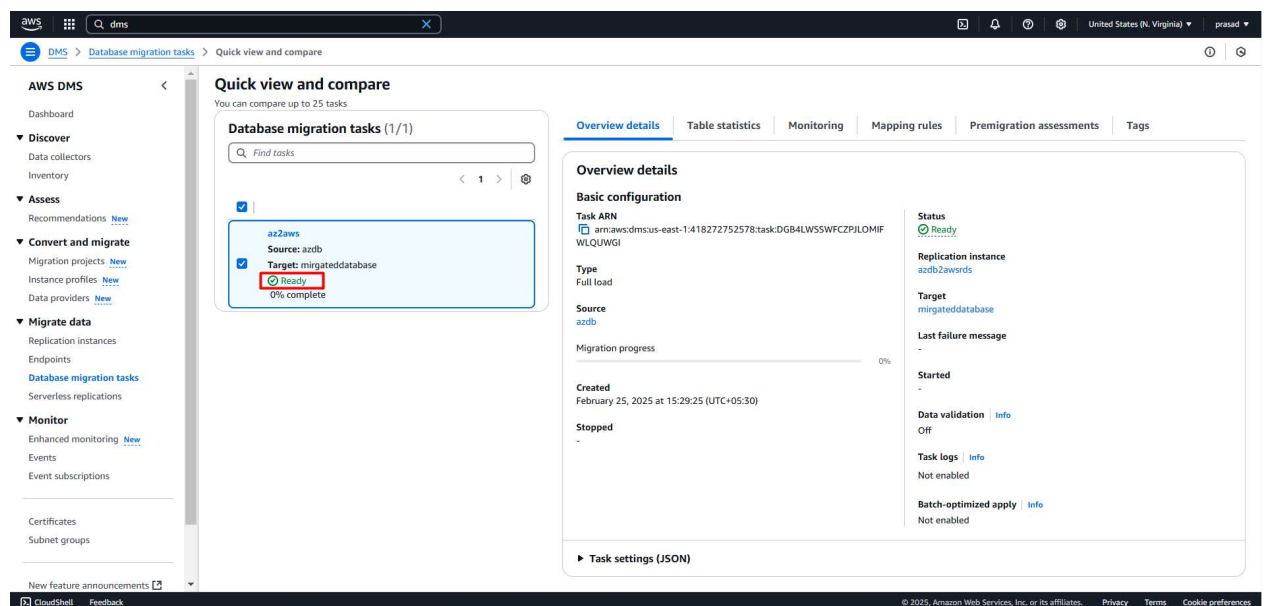
1. Task Initiation

- Started migration task
- Monitored progress through AWS console
- Observed data transfer statistics



2. Validation and Monitoring

- Tracked data validation results
- Monitored for any errors or warnings
- Assessed performance metrics



3. Completion Verification

- Confirmed all tables and data migrated successfully
- Verified row counts between source and target
- Checked for any validation failures

The screenshot shows the AWS DMS console interface. A green banner at the top states: "The migration task az2aws was created successfully. The associated premigration assessment completed." Below this, the "az2aws" migration task is displayed. The "Summary" section shows the task status as "Load complete" and the migration progress as 100%. The "Overview details" tab is selected, showing the "Basic configuration" section with the Task ARN: amaws:dms:us-east-1:418272752578:task:DGB4LWSSWFCZPJLOMIFWLQWGI. The "Replication instance" is azdb2awsrds. The "Created" date is February 25, 2025 at 15:29:25 (UTC+05:30) and the "Stopped" date is February 25, 2025 at 15:47:30 (UTC+05:30). The "Data validation" is Off.

Check Database

The screenshot shows the SQL Server Enterprise Manager interface. The "Home" tab is selected, displaying the "Recovery Model : Simple", "Last Log Backup : Never", and "Owner : rdsa". The "Tables" folder is expanded, showing a list of tables: Orders, Products, and Users. The "Search" bar is visible at the top of the table list.

6.0 Best Practices

6.1 Performance Optimization

1. Instance Sizing

- Select appropriate DMS instance class based on database size
- Configure RDS instance for optimal performance
- Monitor and adjust as needed

2. Network Configuration

- Ensure sufficient bandwidth between environments
- Minimize network latency
- Use same AWS region for DMS and RDS when possible

3. Task Configuration

- Use parallel load for large tables
- Configure appropriate LOB settings
- Optimize batch size for better performance

6.2 Security Measures

1. Network Security

- Use secure connections (SSL/TLS)
- Implement least privilege access
- Remove temporary firewall rules after migration

2. Authentication

- Use strong passwords
- Consider AWS Secrets Manager for credential management
- Implement proper role-based access

3. Data Protection

- Enable encryption in transit and at rest
- Sanitize sensitive data if required
- Implement proper backup strategies

7.0 Troubleshooting Guide

7.1 Common Issues

1. Connectivity Problems

- Firewall restrictions

- Security group configurations
- Network route issues

Resolution Steps:

- Verify firewall rules in Azure
- Check security groups in AWS
- Test connectivity using telnet

2. Permission Issues

- Insufficient database user privileges
- Missing system tables access

Resolution Steps:

- Verify user permissions in both source and target
- Grant necessary privileges to migration user
- Check for specific SQL Server permissions

3. Data Type Incompatibilities

- Different SQL Server versions may have incompatible types

Resolution Steps:

- Review migration task logs
- Modify schema as needed
- Use transformation rules in DMS

4. Performance Bottlenecks

- Slow data transfer rates
- Resource constraints

Resolution Steps:

- Scale up DMS replication instance
- Optimize network settings
- Consider table-level parallel loading

8.0 Project Deliverables

8.1 Documentation

1. Migration Plan

- Detailed steps and timeline
- Resource requirements

- Risk assessment and mitigation
2. Configuration Details
 - Endpoint configurations
 - Replication instance settings
 - Task settings and transformations
 3. Migration Reports
 - Task execution statistics
 - Validation results
 - Performance metrics
 - Issue logs and resolutions
 4. Cutover Plan
 - Application transition steps
 - Rollback procedures
 - Post-migration monitoring approach