“Expert Cloud Consulting” -

Database Migration

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Version 1.0

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“Expert Cloud Consulting”
Database Migration

1.0 Contents

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.

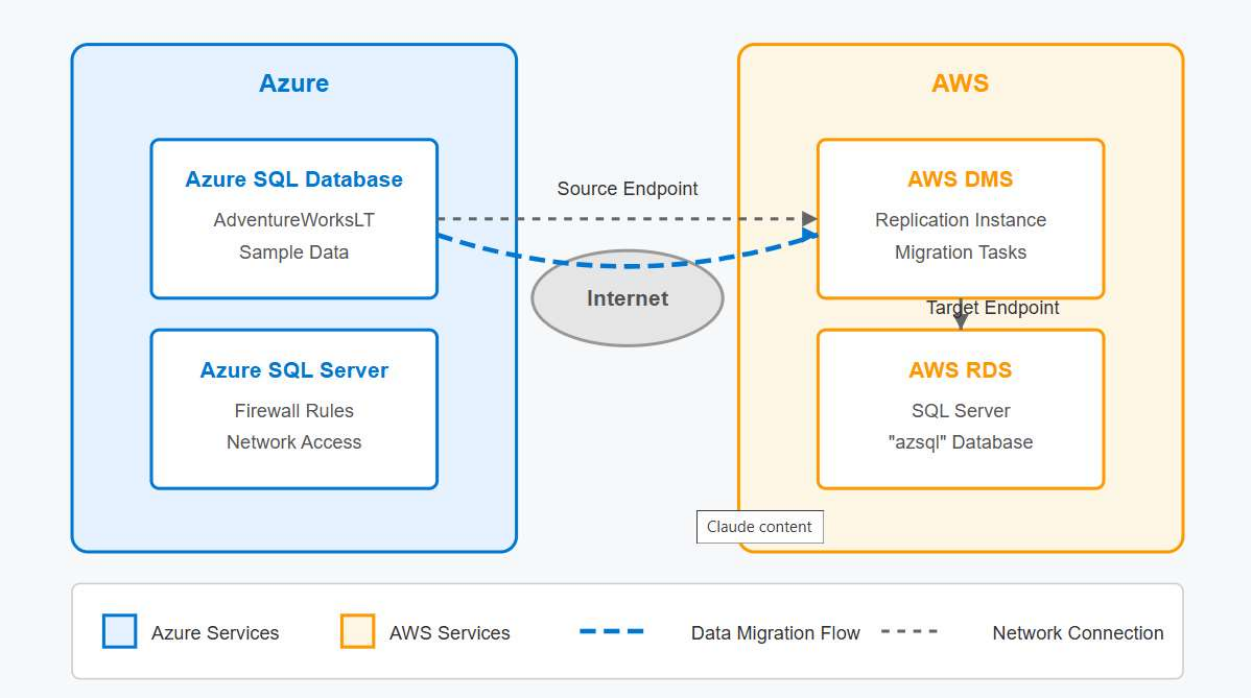
2.3 Document Revisions

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

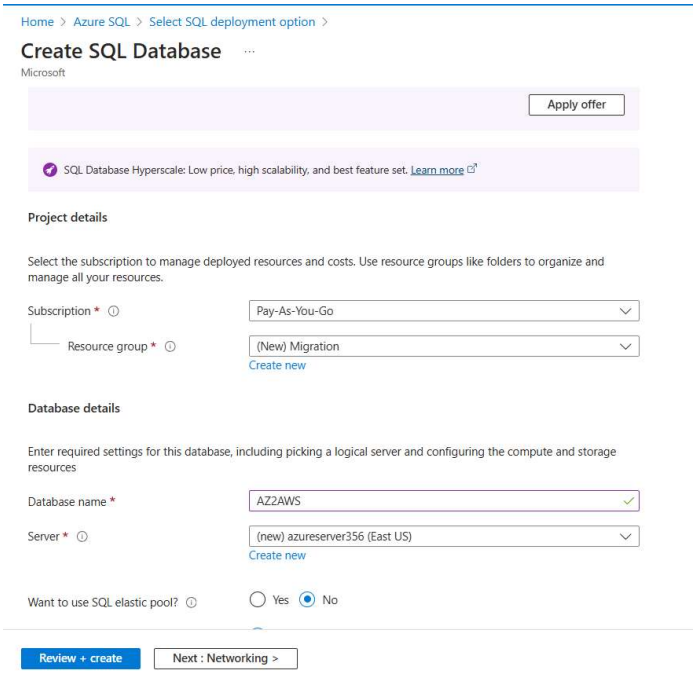
5.1 Pre-migration Phase

5.2 Setup Phase

Step 1: Create Azure SQL Single Database Instance

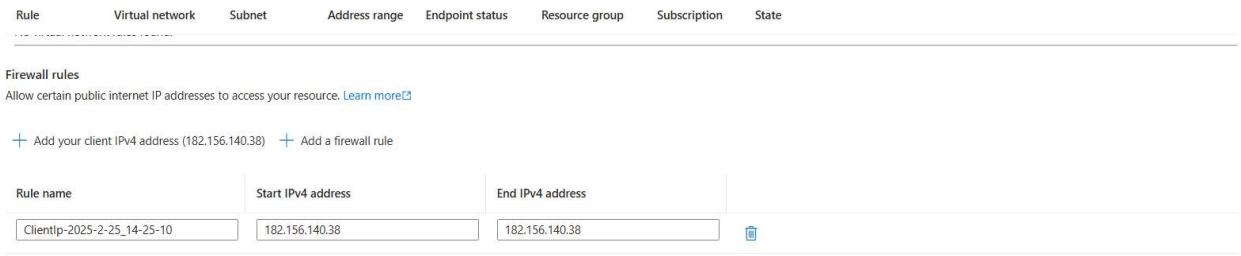
1. Azure SQL Database Setup

   - Selected AdventureWorksLT sample database
   - Configured network access
   - Verified connectivity



2. Firewall Configuration

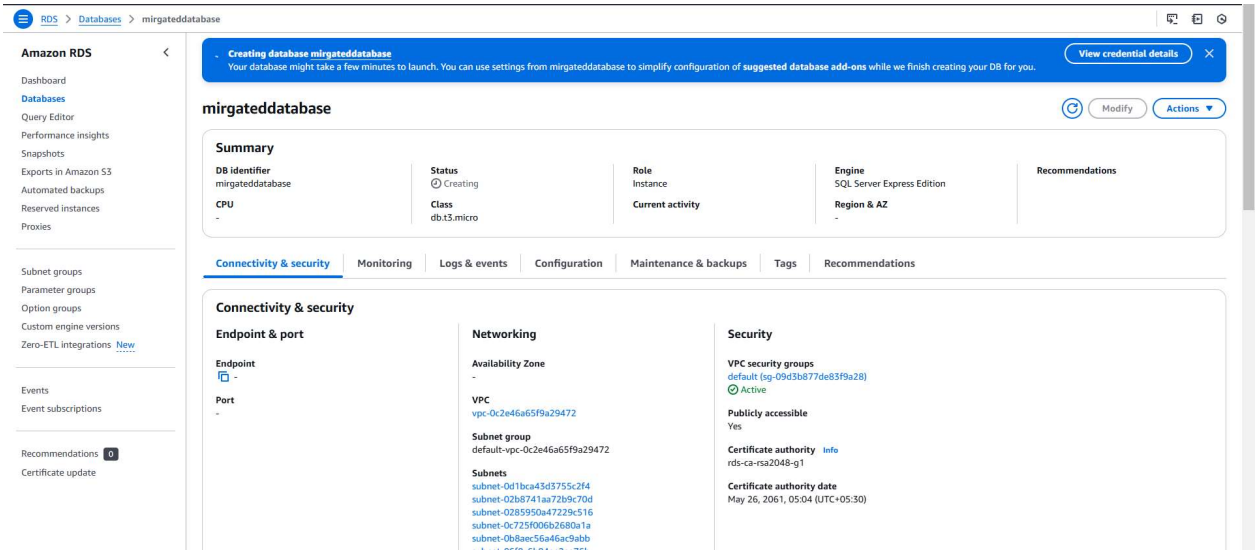
- Added AWS DMS replication instance's public IP to Azure SQL firewall rules
- Verified connectivity from external networks
- Ensured proper security measures



Step 2: Create Amazon RDS for SQL Server Instance

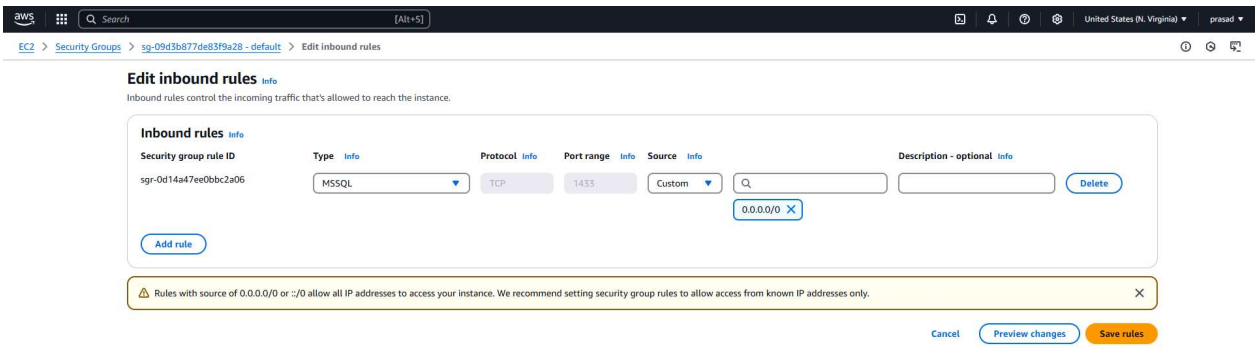
1. Instance Creation

- Selected SQL Server engine version
- Configured basic settings



2. Security Configuration

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



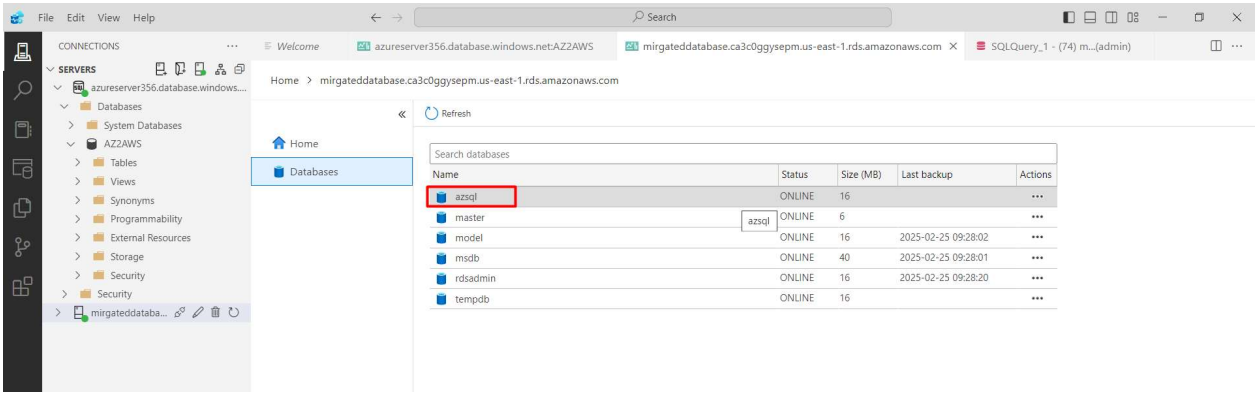
3. Empty Database Creation

Empty Database Creation

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

SSMS Connection Details:

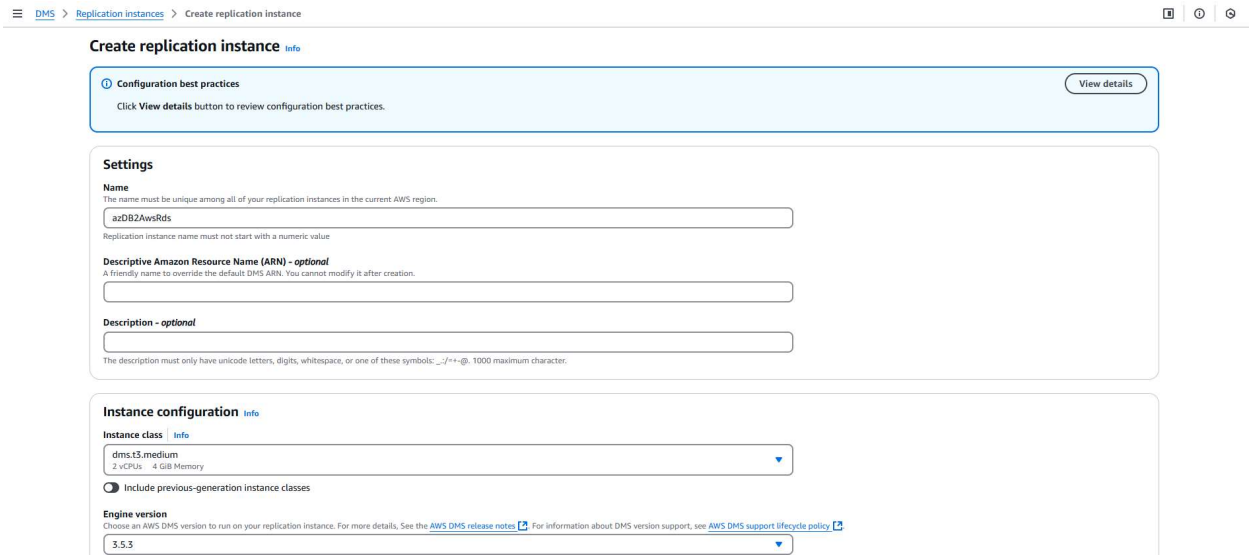
- Server type: Database Engine
- Server name: [endpoint],[port]
- Authentication: SQL Server Authentication
- Login: [Master username]
- Password: [Master password]



Step 3: Create AWS DMS Replication Instance

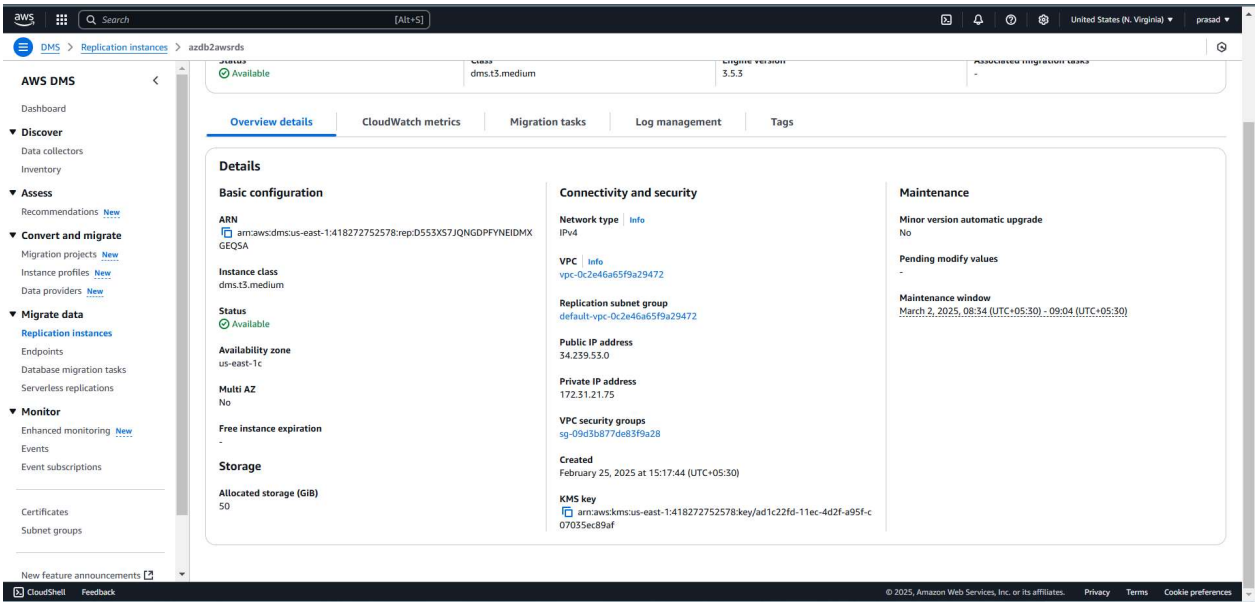
1. Replication Instance Setup

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



2. Network Configuration

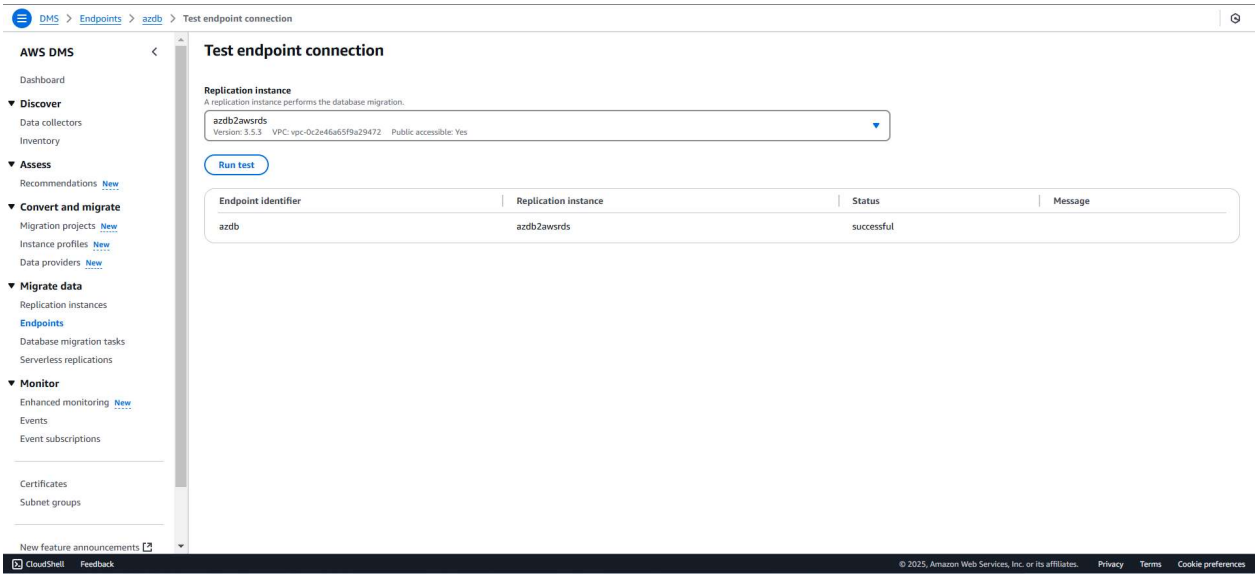
- Ensured connectivity to both Azure SQL and AWS RDS
- Configured security groups to allow traffic
- Verified network paths



Step 4: Create Database Migration Tasks

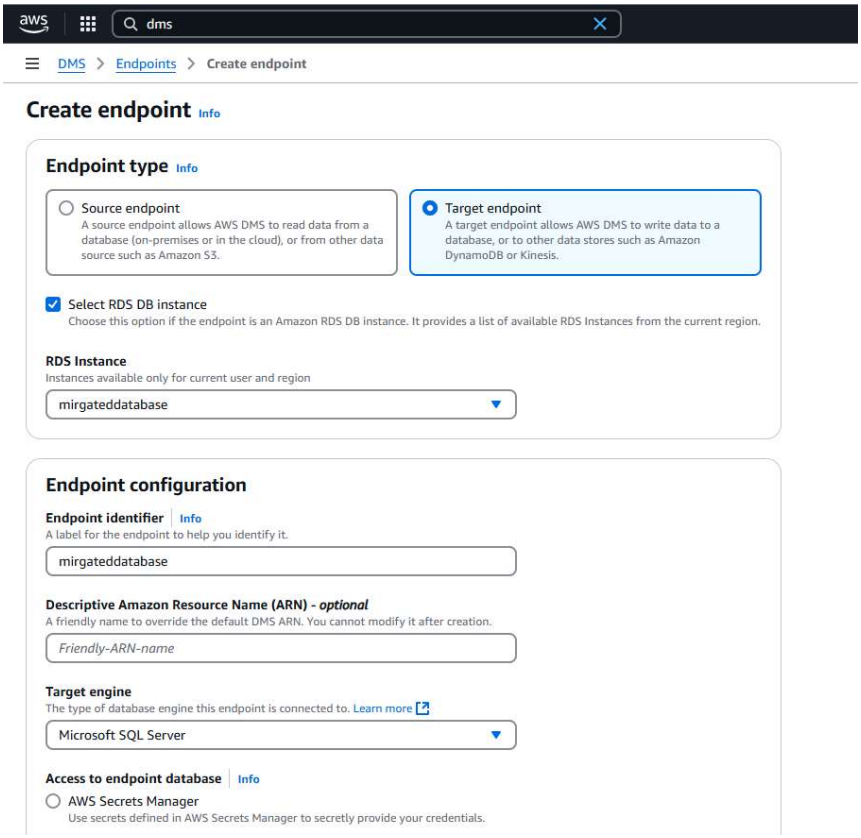
1. Source Endpoint Creation

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

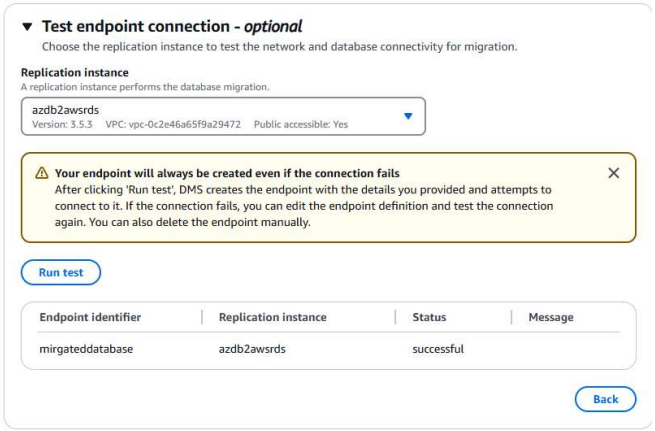


2. Target Endpoint Creation

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

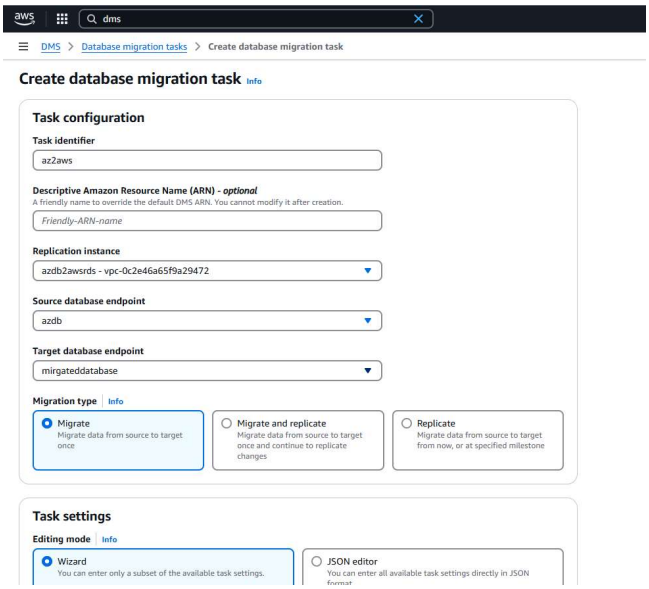


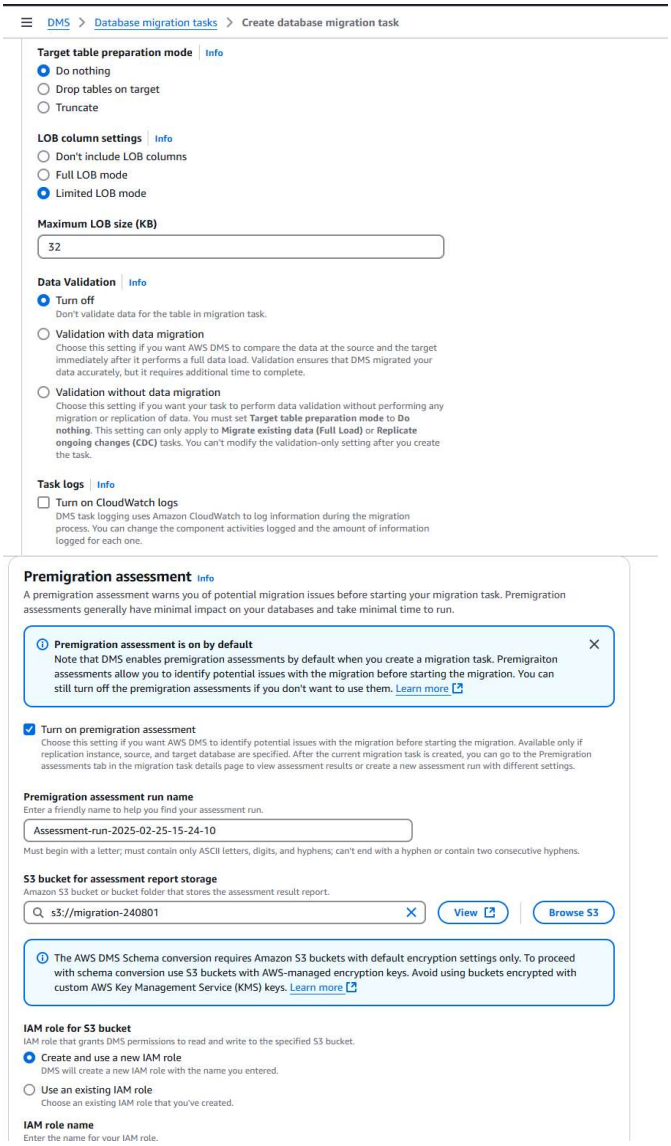
Check the connection.



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
dms
DMS > Database migration tasks > Create database migration task
Create database migration task Info
Task configuration
Task identifier
az2aws
Descriptive Amazon Resource Name (ARN) - optional
A friendly name to override the default DMS ARN. You cannot modify it after creation.
Friendly-ARN-name
Replication instance
azdb2awsrds - vpc-0c2e46a65f9a29472
Source database endpoint
azdb
Target database endpoint
mirgateddatabase
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

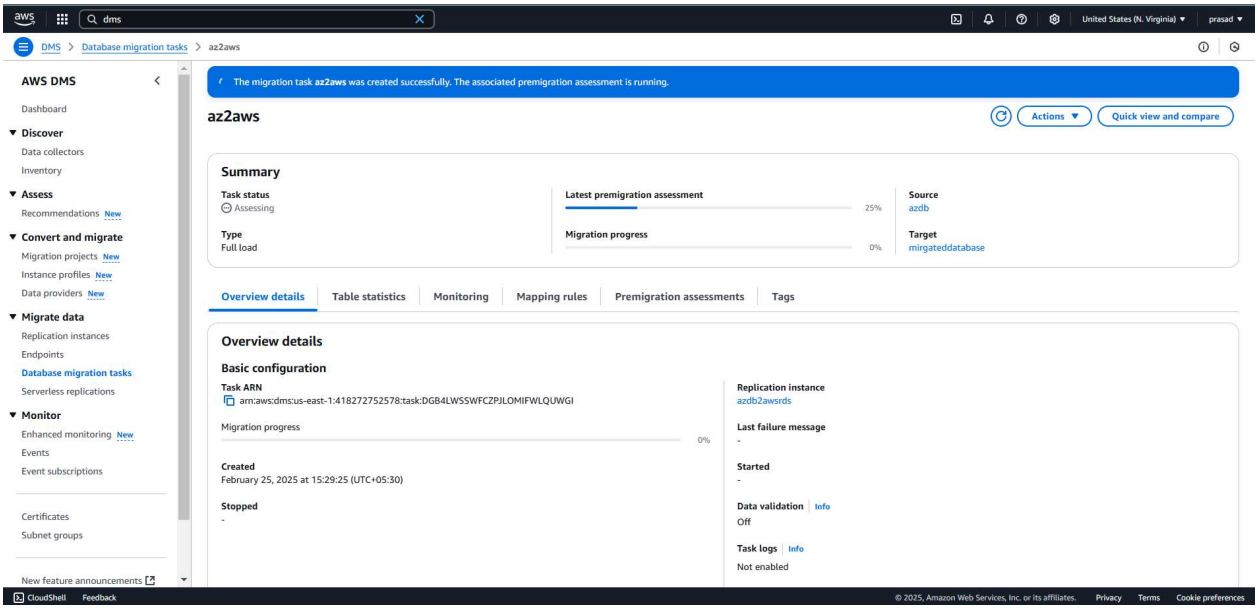

DMS > Database migration tasks > Create database migration task
Target table preparation mode Info
Do nothing
Drop tables on target
Truncate
LOB column settings Info
Don't include LOB columns
Full LOB mode
Limited LOB mode
Maximum LOB size (KB)
32
Data Validation Info
Turn off
Don't validate data for 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. Premigraiton 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.
Assessment-run-2025-02-25-15-24-10
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.
s3://migration-240801
View
Browse S3
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

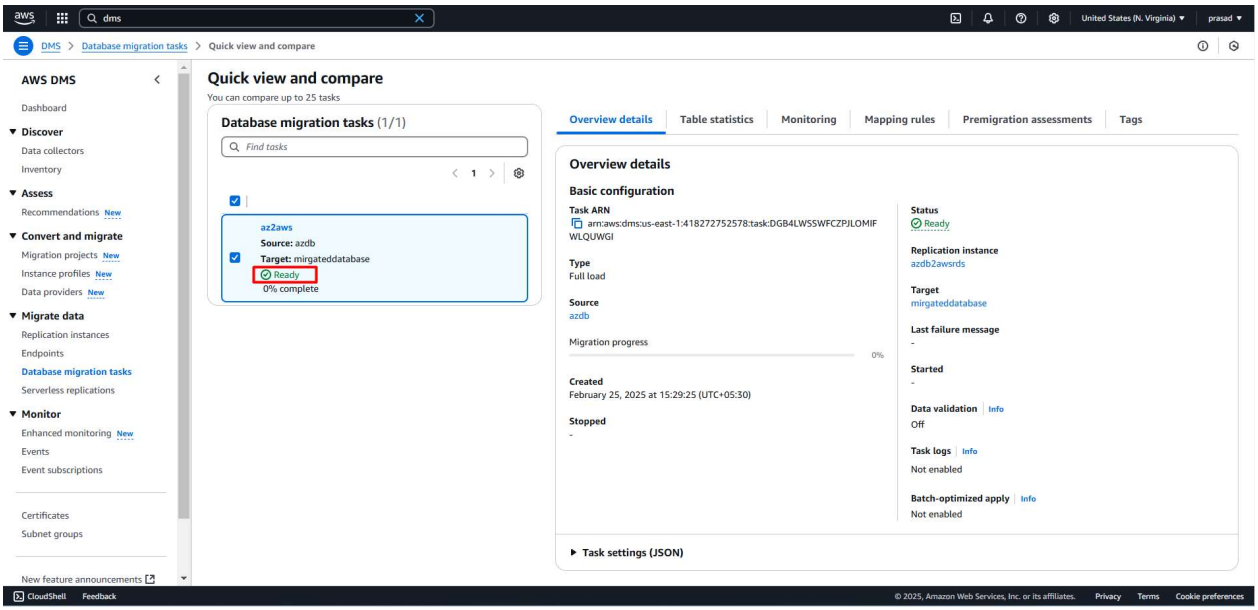
1. Task Initiation

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



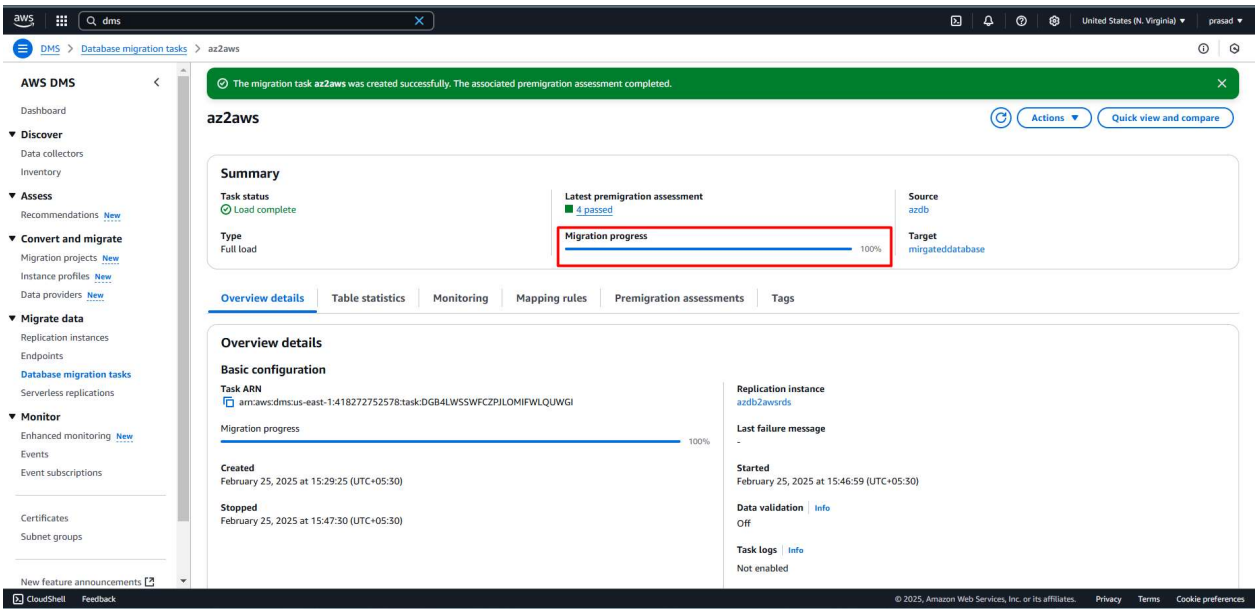
2. Validation and Monitoring

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

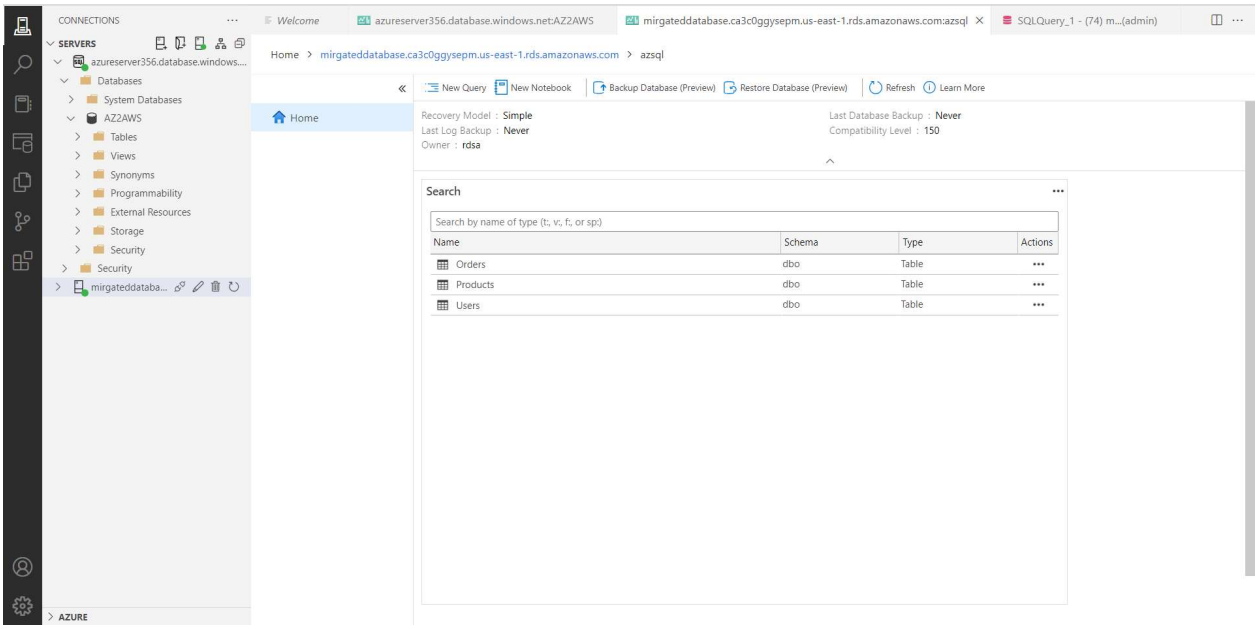


3. Completion Verification

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



Check Database



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