



MIGRATE RDS MySQL TO SKYSQL MARIADB USING AMAZON DATA MIGRATION SERVICE

HOW TO MIGRATE FROM RDS TO SKYSQL WITH LITTLE/NO DOWNTIME?



This is probably the most often asked question to date. Fortunately, AWS makes this quite easy. By following the steps detailed here, migrating data and cutting over to SkySQL can be painless. This document is intended for existing AWS RDS customers looking to migrate to MariaDB SkySQL.

ASSUMPTIONS / PREREQUISITES

Amazon Web Services Database Migration Service will hereon be called AWS DMS.

This demonstration assumes an AWS MariaDB or MySQL RDS instance already exists and has a read replica. For more information:

https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/USER_ReadRepl.html#USER_ReadRepl.Create.

AWS DMS requires an AWS IAM user. The AWS documentation states the user must have the "AdministratorAccess" role. However, this link gives an alternative without giving admin: https://github.com/awsdocs/aws-dms-user-guide/blob/master/doc_source/CHAP_Security.IAMPermissions.md. In addition to those roles outlined, it was also necessary to add the "ListAttachedRolePolicies" role for this demonstration.

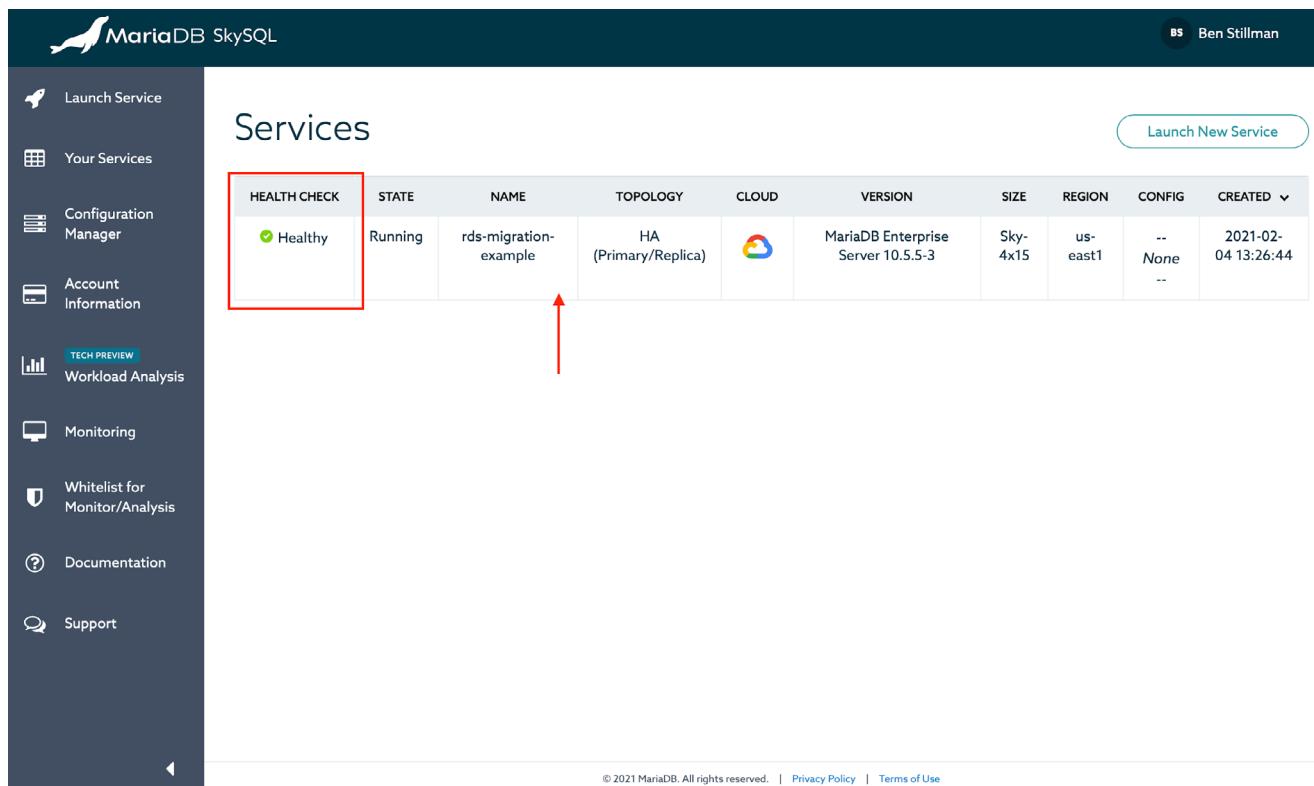
This demonstration assumes a MariaDB SkySQL service has already been started. For more information, see <https://mariadb.com/products/skysql/docs/get-started/>.

Lastly, it is assumed that the SkySQL service's default password has been changed as recommended.

Let's get started!

GATHER INFORMATION FROM DESTINATION SKYSQL SERVICE

Assuming the SkySQL service is created and the "Health Check" column reports the service as "Healthy", click anywhere on the service's row to open the service details. For this demonstration, a "Transactions" topology "HA (Primary/Replica)" service was created within the Google Cloud Platform using "Sky-4x15" instance sizes.



The screenshot shows the MariaDB SkySQL Services page. On the left is a sidebar with various navigation options: Launch Service, Your Services, Configuration Manager, Account Information, Workload Analysis (marked as TECH PREVIEW), Monitoring, Whitelist for Monitor/Analysis, Documentation, and Support. The main area is titled "Services" and contains a table with the following data:

HEALTH CHECK	STATE	NAME	TOPOLOGY	CLOUD	VERSION	SIZE	REGION	CONFIG	CREATED
Healthy	Running	rds-migration-example	HA (Primary/Replica)		MariaDB Enterprise Server 10.5.5-3	Sky-4x15	us-east1	-- None --	2021-02-04 13:26:44

A red box highlights the "Healthy" status in the first column, and a red arrow points from this box to the service name "rds-migration-example" in the second column.

From the service details page, some information needs to be gathered and noted for later use. This includes the service's "Fully Qualified Domain Name" and "Read-Write Port".

For this demonstration, these are:

Fully Qualified Domain Name: rds-migration-example.mdb0001941.db.skysql.net
Read-Write Port: 5001

In addition, verify the IP which this service will be accessed from has been [whitelisted](#).

rds-migration-example

Healthy | MariaDB Enterprise Server 10.5.5-3 | Created 40m ago

Show Credentials Stop Service Delete Service

TOPOLOGY HA (Primary/Replica)	CLOUD Google Cloud	REGION us-east1	SIZE Sky-4x15	STORAGE 100 GB	READ-WRITE PORT 5001	READ-ONLY PORT 5002	REPLICAS 2
----------------------------------	-----------------------	--------------------	------------------	-------------------	-------------------------	------------------------	---------------

Fully Qualified Domain Name

rds-migration-example.mdb0001941.db.skysql.net

Custom Configuration Manage Custom Configurations

No custom configuration currently applied to this service

Whitelisted IP Addresses

Workload Analysis

Request Workload Analysis

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Next, click on “Show Credentials”.

rds-migration-example

Healthy | MariaDB Enterprise Server 10.5.5-3 | Created 44m ago

Show Credentials Stop Service Delete Service

TOPOLOGY HA (Primary/Replica)	CLOUD Google Cloud	REGION us-east1	SIZE Sky-4x15	STORAGE 100 GB	READ-WRITE PORT 5001	READ-ONLY PORT 5002	REPLICAS 2
----------------------------------	-----------------------	--------------------	------------------	-------------------	-------------------------	------------------------	---------------

Fully Qualified Domain Name

rds-migration-example.mdb0001941.db.skysql.net

Custom Configuration Manage Custom Configurations

No custom configuration currently applied to this service

Whitelisted IP Addresses

Workload Analysis

Request Workload Analysis

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Note the "Username" and connection string ("Connect using MariaDB CLI"). This demonstration assumes the "Default Password" has been changed, so it does not need to be noted. Also download the "Certificate authority chain" by clicking "Download".

The screenshot shows the "Temporary Service Login Credentials" dialog box from the MariaDB SkySQL interface. The dialog contains the following information:

- Login Credentials**:
 - Username: DB00003785
 - Default Password: VE1#TmcHRadshbrim)Z7sTlHmg
 - Certificate authority chain: [Download](#) (highlighted with a red arrow)
- 1. Whitelist IP addresses**:

Please remember to "whitelist" your IP address from the services page. For further info please refer to [documentation](#).
- 2. Connect using MariaDB CLI**:

```
mariadb --host rds-migration-example.mdb0001941.db.skysql.net --port 5001 --user DB00003785 -p --ssl-ca ~/Downloads/skysql_chain.pem
```

Note: If you use a MariaDB client older than 10.4, please replace "mariadb" with "mysql"
- 3. Change the default password**:

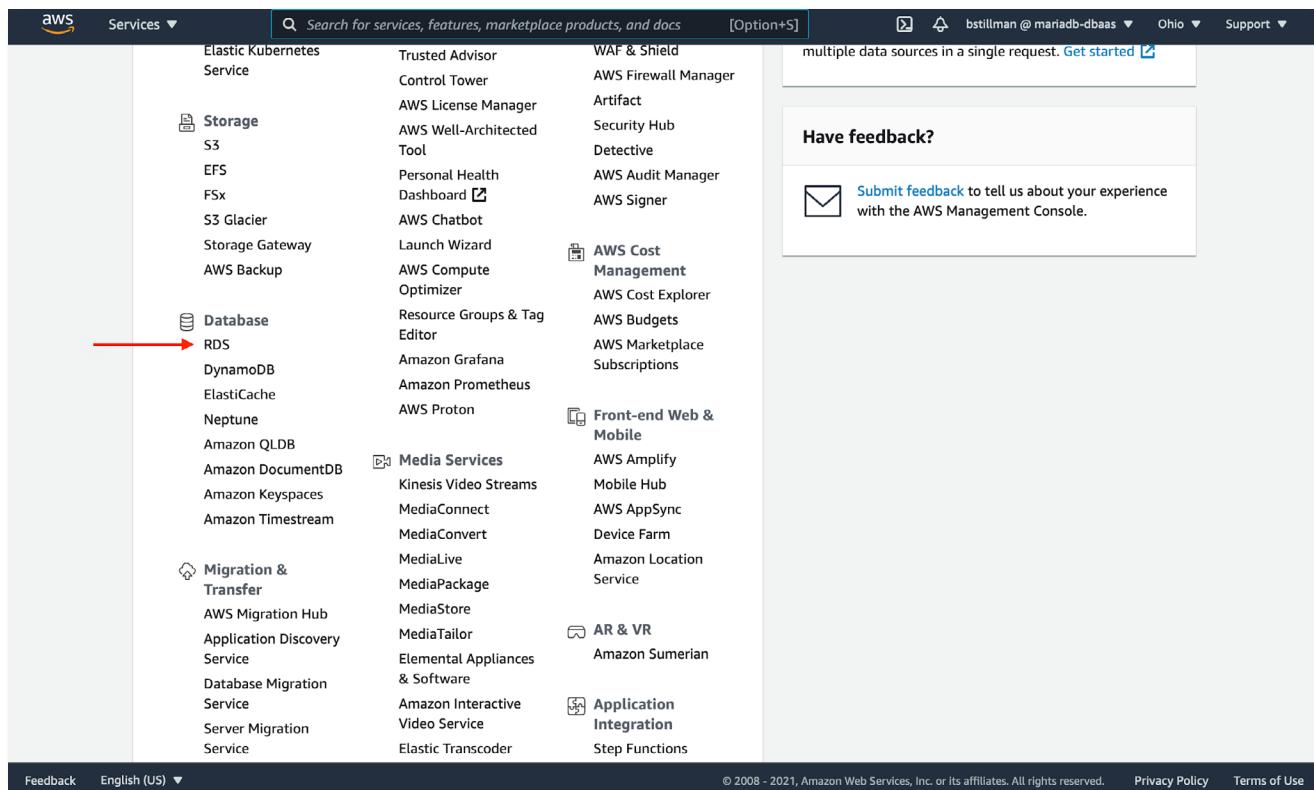
```
SET PASSWORD FOR 'DB00003785'@'%' = PASSWORD('newpass');
```

A "Close" button is located at the bottom right of the dialog.

GATHER INFORMATION FROM SOURCE RDS INSTANCE

Next, gather the necessary information from the RDS instance which is to be migrated.

From the AWS Portal, under "Databases", click "RDS".



The screenshot shows the AWS Management Console Services page. The navigation bar at the top includes the AWS logo, a 'Services' dropdown, a search bar, and user information (bstillman @ mariadb-dbaas, Ohio, Support). Below the search bar is a callout for 'multiple data sources in a single request' with a 'Get started' button. On the left, there's a sidebar with categories like Storage, Database, Migration & Transfer, and others. A red arrow points to the 'RDS' link under the 'Database' category. The main content area lists various AWS services in a grid format, including Elastic Kubernetes Service, Trusted Advisor, WAF & Shield, AWS Firewall Manager, AWS License Manager, AWS Well-Architected Tool, Artifact, Security Hub, Detective, AWS Audit Manager, AWS Signer, AWS Chatbot, Launch Wizard, AWS Compute Optimizer, AWS Cost Management, AWS Cost Explorer, Resource Groups & Tag Editor, AWS Budgets, AWS Marketplace Subscriptions, Amazon Grafana, Amazon Prometheus, AWS Proton, AWS Front-end Web & Mobile, AWS Amplify, Mobile Hub, AWS AppSync, Device Farm, AWS Media Services, Kinesis Video Streams, MediaConnect, MediaConvert, MediaLive, MediaPackage, MediaStore, MediaTailor, Elemental Appliances & Software, Amazon Interactive Video Service, Elastic Transcoder, AR & VR, Amazon Sumerian, Application Integration, and Step Functions. At the bottom, there are links for Feedback, English (US), Copyright notice (© 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved.), Privacy Policy, and Terms of Use.

Next, click “DB Instances”.

The screenshot shows the AWS RDS Dashboard. On the left sidebar, under the "Resources" section, there is a red arrow pointing to the "Subnet groups" link. The main content area displays the "Amazon Aurora" information box and the "Resources" section. The "Resources" section contains a table with the following data:

Category	Count
DB Instances (1/40)	1
Allocated storage (0.02 TB/100 TB)	1
Parameter groups (7)	7
Click here to increase DB instances limit	1
DB Clusters (0/40)	0
Reserved instances (0/40)	0
Option groups (4)	4
Snapshots (4)	4
Default (5)	5
Custom (2/100)	2
Event subscriptions (0/20)	0
Subnet groups (4/50)	4
Supported platforms VPC	1
Recent events (4)	4
Default network vpc-50f77938	1
Event subscriptions (0/20)	0

Below the resources section is a "Create database" button. The bottom of the page includes standard AWS footer links: Feedback, English (US), Privacy Policy, and Terms of Use.

From here, click on the “DB identifier” of the instance to be migrated. For this demonstration, it's “stillman-dms-sky”.

The screenshot shows the AWS RDS Databases page. On the left sidebar, under the "Databases" section, there is a red arrow pointing to the "DB identifier" column of the table. The main content area displays the "Databases" table with the following data:

DB identifier	Instance	Engine	Region & AZ	Size
stillman-dms-sky	MySQL Community	us-east-2b	db.t2.micro	

The bottom of the page includes standard AWS footer links: Feedback, English (US), Privacy Policy, and Terms of Use.

From this page, note the “Endpoint” and “Port”.

Amazon RDS Services ▾

RDS > Databases > stillman-dms-sky

stillman-dms-sky

Summary

DB identifier stillman-dms-sky	CPU <div style="width: 2.07%;">2.07%</div>	Status Available	Class db.t2.micro
Role Instance	Current activity <div style="width: 0%;">0 Connections</div>	Engine MySQL Community	Region & AZ us-east-2b

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

Connectivity & security

Endpoint & port	Networking	Security
Endpoint stillman-dms-sky.cmdxr9mqv3ld.us-east-2.rds.amazonaws.com	Availability zone us-east-2b	VPC security groups ben-benchmark-08282019 (sg-096d9ff718b4e8078) (active)
Port 3306	VPC vpc-04791123e8a890d1e	Public accessibility Yes
	Subnet group default-vpc-04791123e8a890d1e	Certificate authority

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Click on “Configuration”. Find and note the Amazon Resource Name (ARN).

Amazon RDS Services ▾

Role Instance Current activity Engine Region & AZ

Availability zone MySQL Community us-east-2b

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

Instance

Configuration	Instance class	Storage	Performance Insights
DB instance id stillman-dms-sky	Instance class db.t2.micro	Encryption Not Enabled	Performance Insights enabled No
Engine version 5.7.31	vCPU 1	Storage type General Purpose (SSD)	
DB name -	RAM 1 GB	IOPS	
License model General Public License	Availability	Storage 20 GiB	
Option groups default:mysql-5.7	Master username admin	Storage autoscaling Enabled	
Amazon Resource Name (ARN) arn:aws:rds:us-east-2:34719114792:db:stillman-dms-sky	IAM db authentication Not Enabled	Maximum storage threshold 1000 GiB	
Resources ID	Multi-AZ No		

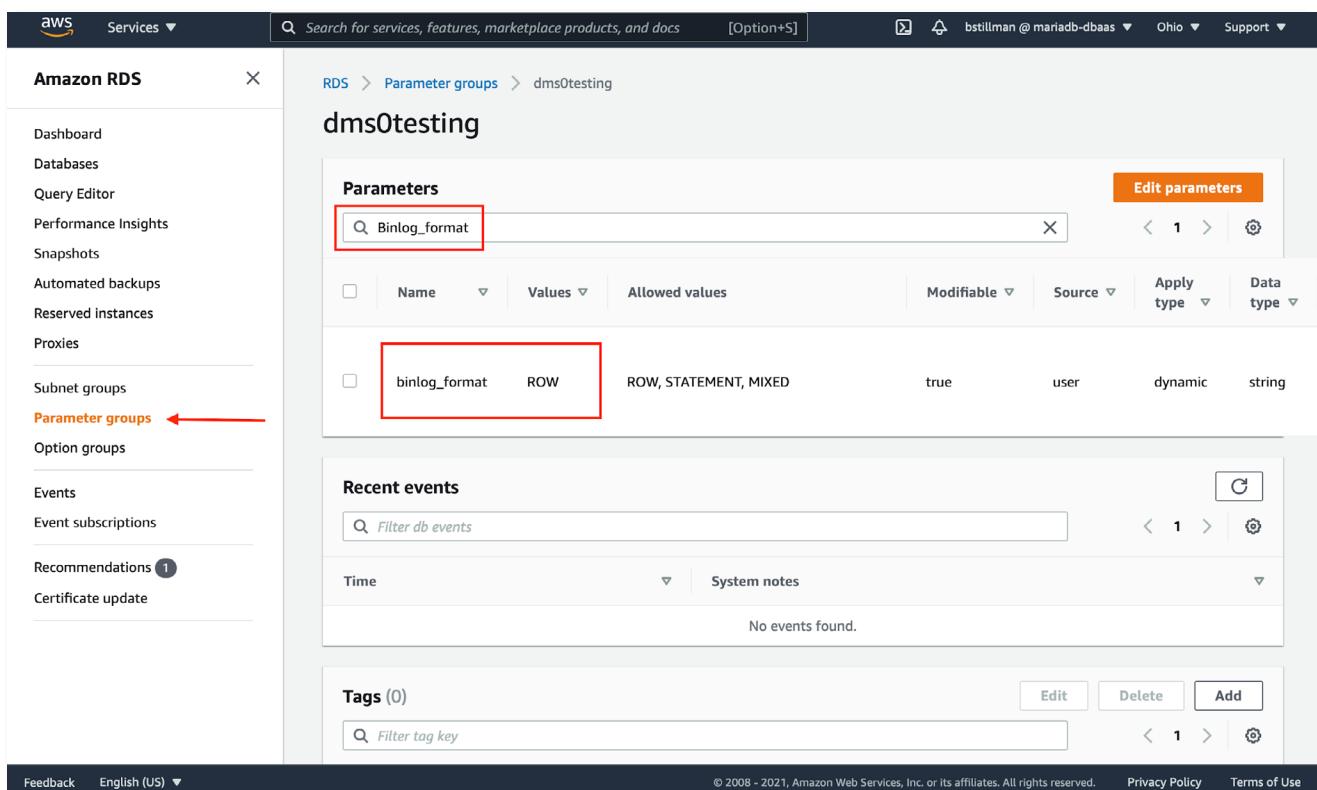
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Now that the necessary information has been gathered, next is to configure the RDS instance and SkySQL service.

CONFIGURE THE RDS INSTANCE

In order for AWS DMS to function properly, a few things need to be configured on the RDS instance to be migrated.

First, change the binary logging format from MIXED to ROW. For this demonstration, a new "Parameter Group" was created named "dms0testing" because this demonstration instance did not have a pre-existing "Parameter Group". The only change made was setting "binlog_format" to "ROW". (Unfortunately, although "binlog_format" is a dynamic variable, it cannot be set dynamically in RDS.)



The screenshot shows the AWS RDS Parameter Groups page. On the left sidebar, 'Parameter groups' is highlighted with a red arrow. The main area displays the 'dms0testing' parameter group. A red box highlights the search bar containing 'Binlog_format' and the parameter entry for 'binlog_format' with value 'ROW'. Other parameters listed include 'Values' (ROW, STATEMENT, MIXED), 'Modifiable' (true), 'Source' (user), 'Apply type' (dynamic), and 'Data type' (string). Below this, sections for 'Recent events' and 'Tags (0)' are shown.

Modify the RDS instance to use the new "Parameter Group". Note this change must take effect before starting the AWS DMS "Database Migration Task" later.

Connect to the AWS RDS instance.

```
mysql --host stillman-dms-sky.cmdxr9mqv3ld.us-east-2.rds.amazonaws.com --Port 3306  
--user admin -p  
Enter password:
```

Verify the variable “binlog_format” has been correctly applied.

```
SHOW GLOBAL VARIABLES LIKE 'binlog_format';
```

Next, configure the binary logs to not expire for at least 24 hours. This is done via the command-line interface.

Use rds_set_configuration to set the binlog retention.

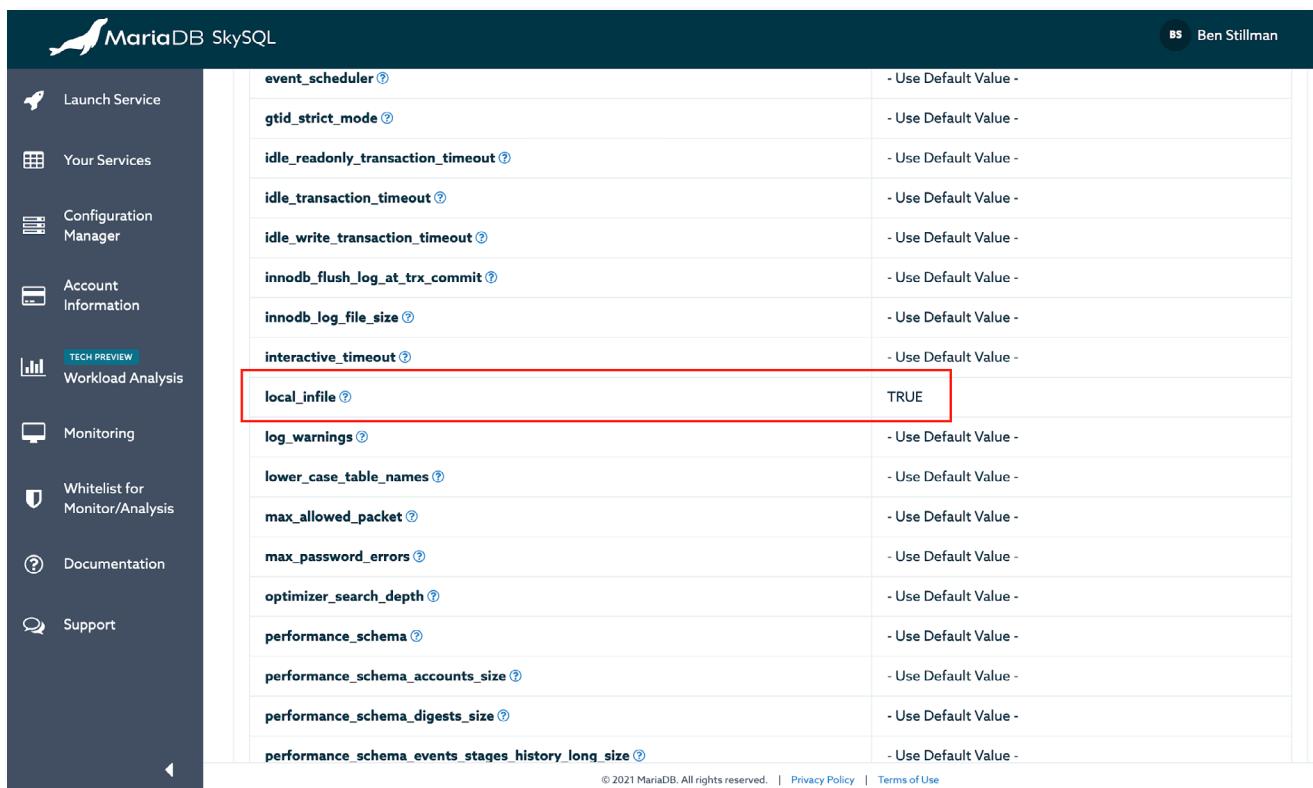
```
CALL mysql.rds_set_configuration('binlog retention hours', 24);
```

CONFIGURE THE SKYSQL SERVICE

AWS DMS uses `LOAD DATA LOCAL INFILE` for the initial data load process. By default, the variable `LOCAL_INFILE` is disabled in SkySQL. For this demonstration, a new configuration was created in SkySQL using the "Configuration Manager" named "DMS Testing". Only `LOCAL_INFILE` was modified. If the SkySQL target instance already has a custom configuration, that configuration can be edited instead of creating a new custom configuration.

For more information about "Configuration Manager" and applying custom configurations to SkySQL services, see <https://mariadb.com/products/skysql/docs/instructions/configuration-manager/>.

This change must take effect before starting the AWS DMS "Database Migration Task" later.



The screenshot shows the MariaDB SkySQL Configuration Manager interface. On the left, there's a sidebar with various navigation options: Launch Service, Your Services, Configuration Manager (which is selected), Account Information, Workload Analysis (marked as TECH PREVIEW), Monitoring, Whitelist for Monitor/Analysis, Documentation, and Support. The main area is titled "Configuration Manager" and shows a list of MySQL configuration variables. One variable, `local_infile`, is highlighted with a red border and has its value set to `TRUE`. Other variables listed include `event_scheduler`, `gtid_strict_mode`, `idle_readonly_transaction_timeout`, `idle_transaction_timeout`, `idle_write_transaction_timeout`, `innodb_flush_log_at_trx_commit`, `innodb_log_file_size`, `interactive_timeout`, `log_warnings`, `lower_case_table_names`, `max_allowed_packet`, `max_password_errors`, `optimizer_search_depth`, `performance_schema`, `performance_schema_accounts_size`, `performance_schema_digests_size`, and `performance_schema_events_stages_history_long_size`. Each variable has a link icon next to it.

Connect to the SkySQL service via the command-line interface.

```
mariadb --host rds-migration-example.mdb0001941.db.skysql.net --port 5001 --user DB00003785 -p --ssl  
Enter password:
```

Verify the variable “local_infile” has been correctly applied.

```
SHOW GLOBAL VARIABLES LIKE 'local_infile';
```

CREATE USER FOR AWS DMS CONNECTION ON SKYSQL SERVICE

It is best practice to have separate users for each application or action. For this demonstration, create a user to be used exclusively for AWS DMS to connect to the SkySQL service.

Create the AWS DMS user.

```
CREATE USER 'dmsuser'@'%'  
IDENTIFIED BY '6Hvmw@GQERbRygNx#j3dMwN!rrH2t2v&WH';
```

Grant the appropriate privileges to the AWS DMS user for the database to be migrated. For this demonstration, the database which will be migrated is named "dmstestdb". This database does not yet exist within the SkySQL service.

```
GRANT ALTER, CREATE, DROP, INDEX, INSERT, UPDATE, DELETE, SELECT  
ON dmstestdb.*  
TO 'dmsuser'@'%';
```

Grant the appropriate privileges to the AWS DMS user for the "awsdms_control" database used by AWS DMS to keep track of the replication status.

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, INDEX, ALTER, CREATE TEMPORARY TABLES,  
LOCK TABLES, EXECUTE, CREATE VIEW, SHOW VIEW, CREATE ROUTINE, ALTER ROUTINE, EVENT,  
TRIGGER,  
DELETE HISTORY  
ON awsdms_control.*  
TO 'dmsuser'@'%';
```

CREATE DATABASE SCHEMA ON SKYSQL

While connected to the SkySQL service, create the database and table(s) that will be migrated from RDS. This is done directly on the SkySQL service rather than allowing AWS DMS to create them because AWS DMS only creates the most basic structure to migrate the data. Thus things like auto-increments are left out.

```
CREATE DATABASE testing;
CREATE TABLE TableA (
    id int(11) NOT NULL AUTO_INCREMENT,
    uuid_junk varchar(50) NOT NULL,
    create_ts timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,
    PRIMARY KEY (`id`)
);
```

CREATE USER FOR AWS DMS CONNECTION ON RDS INSTANCE

Following best practice, create an AWS DMS specific user on the RDS instance to be migrated. This user will be used by AWS DMS to connect to the RDS instance.

Connect to the AWS RDS instance.

```
mysql --host stillman-dms-sky.cmdxr9mqv3ld.us-east-2.rds.amazonaws.com --Port 3306  
--user admin -p  
Enter password:
```

Create the AWS DMS user.

```
CREATE USER 'dmsuser'@'%'  
IDENTIFIED BY 'kfjR67HEWFk1g98FGE#hyghdfp7@!';
```

Grant the necessary privileges to the AWS DMS user.

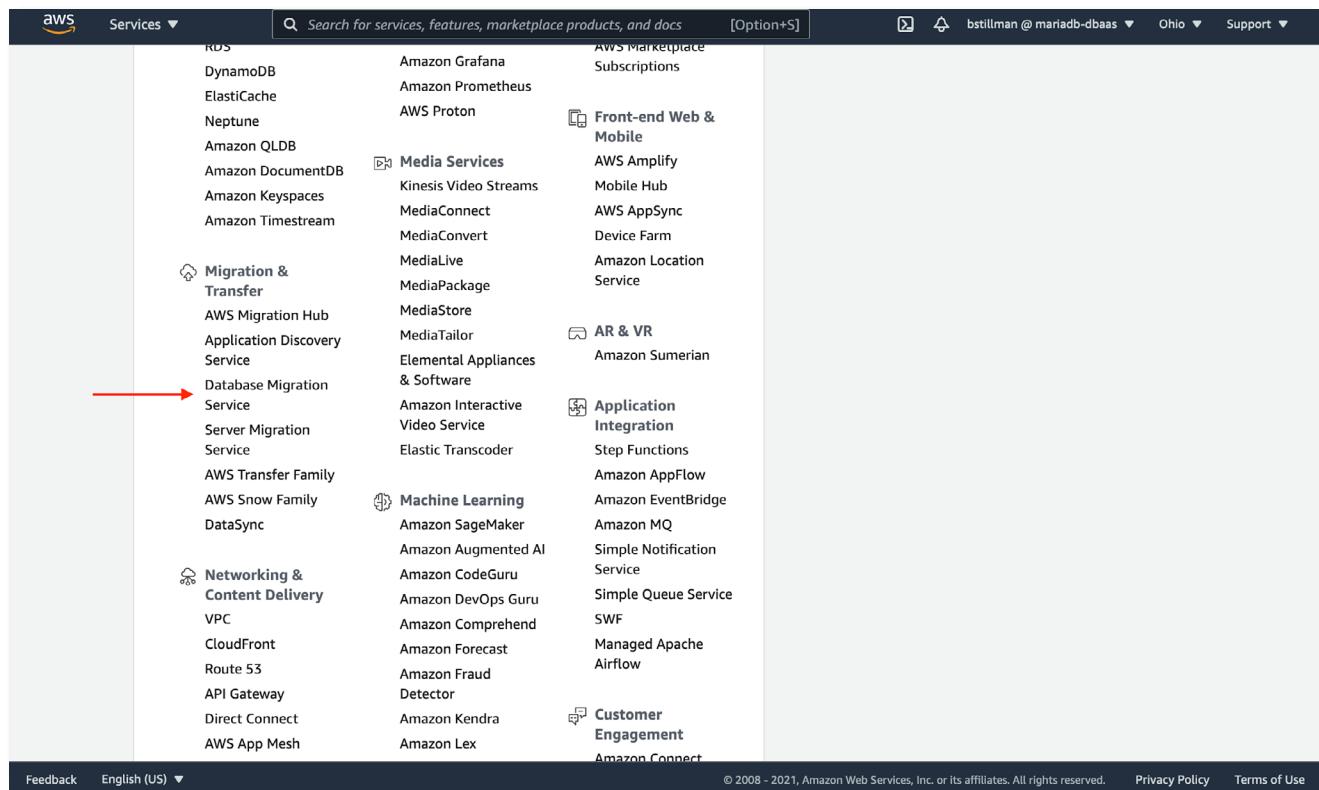
```
GRANT REPLICATION CLIENT, REPLICATION SLAVE  
ON *.* TO 'dmsuser'@'%';
```

At this point, the AWS DMS user is created on both the source (AWS RDS instance) and the target (SkySQL service).

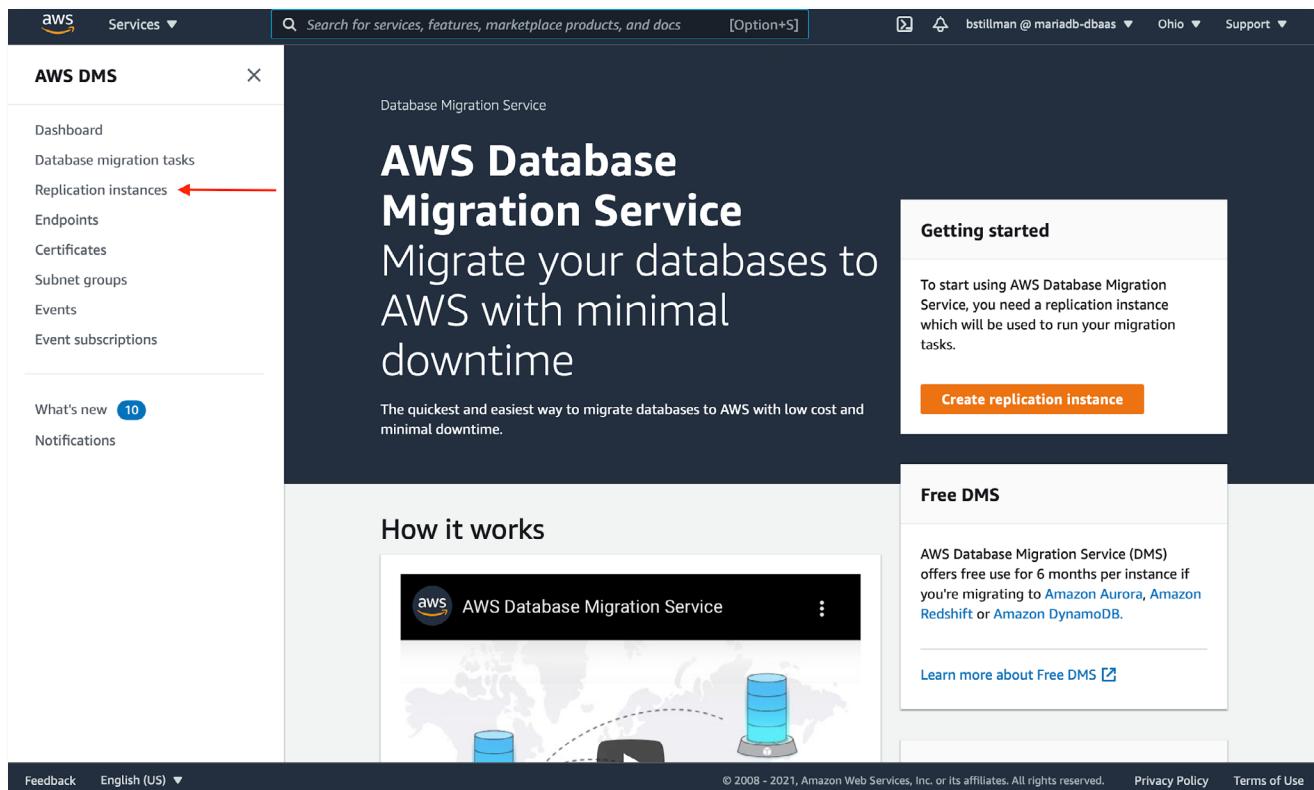
CREATE AWS DMS REPLICATION INSTANCE

In order to begin setting up AWS DMS to migrate the RDS database to SkySQL, a "Replication instance" needs to be created.

From the AWS Console, click on "Database Migration Service" under "Migration & Transfer".

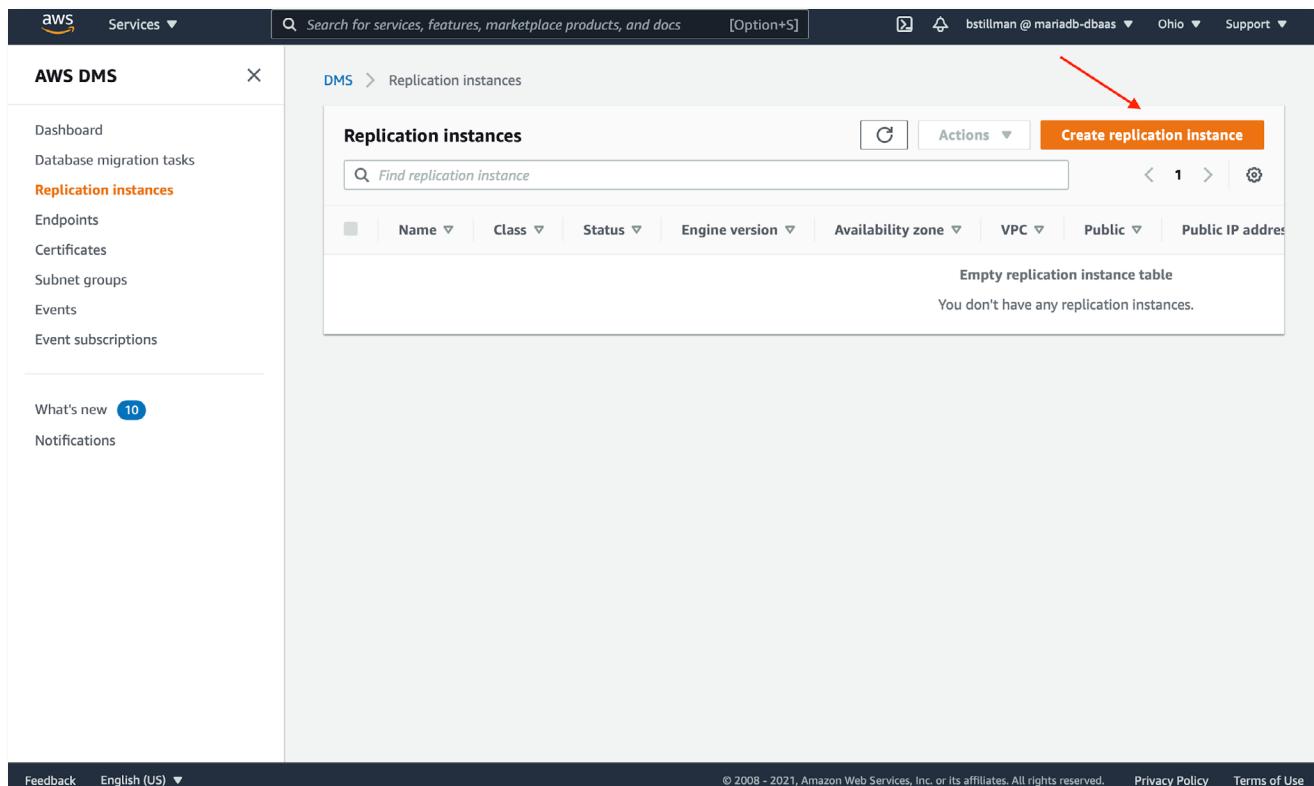


Click on “Replication instances”.



The screenshot shows the AWS DMS homepage. On the left, a sidebar menu lists options like Dashboard, Database migration tasks, Replication instances, Endpoints, Certificates, Subnet groups, Events, and Event subscriptions. A red arrow points to the "Replication instances" link. The main content area features a large title "AWS Database Migration Service" and a subtitle "Migrate your databases to AWS with minimal downtime". Below this, a section titled "How it works" includes a diagram showing data flowing from a source database through the AWS DMS interface to a target database. To the right, there's a "Getting started" section with a "Create replication instance" button, and another section about "Free DMS" with a link to learn more.

Click on the “Create replication instance” button.



The screenshot shows the "Replication instances" page within the AWS DMS console. The left sidebar remains the same as the previous screenshot. The main area displays a table with columns for Name, Class, Status, Engine version, Availability zone, VPC, Public, and Public IP address. The table is currently empty, showing the message "Empty replication instance table" and "You don't have any replication instances." A red arrow points to the "Create replication instance" button located at the top right of the table header.

Now configure the “Replication instance”. Enter a “Name” and “Description” for this “replication instance”. Then select an “Instance class”.

AWS DMS Services ▾

DMS > Replication instances > Create replication instance

Create replication instance

Replication instance configuration

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

Replication instance name must not 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

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

Instance class: Info
Choose an appropriate instance class for your replication needs. Each instance class provides differing levels of compute, network and memory capacity. [DMS pricing](#)

▼
2 vCPUs 4 GiB Memory

Include previous-generation instance classes

Engine version
Choose an AWS DMS version to run on your replication instance. [DMS versions](#)

7.1.7

Feedback English (US) ▾ bstillman@mariadb-dbaas Ohio Support

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Scroll down to continue the configuration. “Allocated storage” defaults to 50 GB. For this demonstration, this is sufficient. Select the “VPC” which this “replication instance” should run. For this demonstration, the VPC where the RDS instance to be migrated runs was selected. Next, “Publicly accessible” should be checked by default. Verify that it is checked.

AWS DMS Services ▾

DMS > Replication instances > Create replication instance

Replication instance configuration

Instance class: Info
Choose an appropriate instance class for your replication needs. Each instance class provides differing levels of compute, network and memory capacity. [DMS pricing](#)

▼
2 vCPUs 4 GiB Memory

Include previous-generation instance classes

Engine version
Choose an AWS DMS version to run on your replication instance. [DMS versions](#)

3.4.3

Include Beta DMS versions

Allocated storage (GiB): Info
Choose the amount of storage space you want for your replication instance. AWS DMS uses this storage for log files and cached transactions while replication tasks are in progress.

VPC
Choose an Amazon Virtual Private Cloud (VPC) where your replication instance should run.

Multi AZ
If you choose this option, AWS DMS will perform a multi-AZ deployment, with a primary instance in one availability zone (AZ) and a standby instance in another AZ. This configuration provides a highly available, fault-tolerant replication environment. Billing is based on [DMS pricing](#)

Publicly accessible
If you choose this option, AWS DMS will assign a public IP address to your replication instance, and you'll be able to connect to databases outside of your Amazon VPC.

▶ Advanced security and network configuration

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Scroll to the bottom of the page. For this demonstration, no other configuration is needed. Click the “Create” button.

AWS DMS

Choose the amount of storage space you want for your replication instance. AWS DMS uses this storage for log files and cached transactions while replication tasks are in progress.

50

VPC

Choose an Amazon Virtual Private Cloud (VPC) where your replication instance should run.

vpc-04791123e8a890d1

Multi AZ

If you choose this option, AWS DMS will perform a multi-AZ deployment, with a primary instance in one availability zone (AZ) and a standby instance in another AZ. This configuration provides a highly available, fault-tolerant replication environment. Billing is based on [DMS pricing](#).

Publicly accessible

If you choose this option, AWS DMS will assign a public IP address to your replication instance, and you'll be able to connect to databases outside of your Amazon VPC.

► Advanced security and network configuration

► Maintenance

► Tags

Create

Once the newly created “replication instances” has a “Status” of “Available”, click on the instance’s “Name” to see more details.

AWS DMS

DMS > Replication instances

Replication instances (1)

Name	Class	Status	Engine version	Availability zone	VPC
rds-skysql-repl-inst	dms.t3.medium	Available	3.4.3	us-east-2c	vpc-04791123e8a890d1

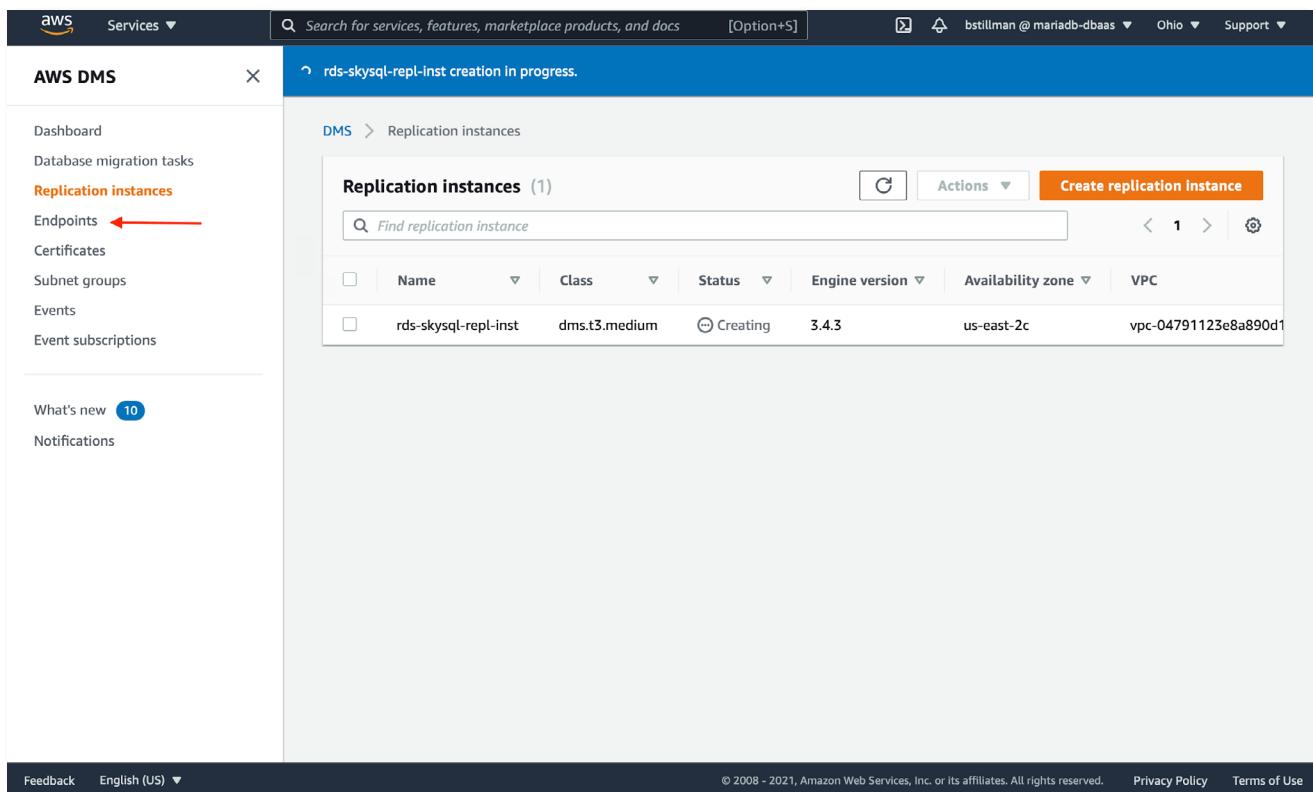
From here, note the “Public IP address” and “Private IP address”.

The screenshot shows the AWS DMS console. On the left, a sidebar menu includes options like Dashboard, Database migration tasks, Replication instances (which is selected and highlighted in orange), Endpoints, Certificates, Subnet groups, Events, Event subscriptions, and links for What's new (with 10 notifications) and Notifications. The main content area has a breadcrumb path: DMS > Replication instances > rds-skysql-repl-inst. The title is "rds-skysql-repl-inst". Below it is a "Replication instance summary" card with columns for Class (dms.t3.medium), Engine version (3.4.3), Status (Available), and Associated migration tasks (0). Below the summary are tabs for Overview details (selected), CloudWatch metrics, Migration tasks, Log management, and Tags. A "Details" section contains "Basic configuration" with fields for ARN (arn:aws:dms:us-east-2:347119114792:rep:S7EALKD4BFCJVMLJ3FAKWOTAVA25SG2IMLG2 JUI), Public IP address (3.15.80.73), Instance class (dms.t3.medium), Status (Available), Private IP address (172.30.2.157), and Free instance expiration (N/A). The Public IP address and Private IP address fields are highlighted with red boxes.

CREATE AWS DMS SOURCE ENDPOINT

Next, the Source Endpoint needs to be created.

Click on “Endpoints” in the navigation menu on the left side.



The screenshot shows the AWS DMS console interface. On the left, there is a navigation sidebar with the following items:

- Dashboard
- Database migration tasks
- Replication instances** (highlighted)
- Endpoints (highlighted with a red arrow)
- Certificates
- Subnet groups
- Events
- Event subscriptions

On the right, the main content area displays the "Replication instances" page. At the top, a message says "rds-skysql-repl-inst creation in progress." Below this, the breadcrumb navigation shows "DMS > Replication instances". The main table is titled "Replication instances (1)" and contains the following data:

Name	Class	Status	Engine version	Availability zone	VPC
rds-skysql-repl-inst	dms.t3.medium	Creating	3.4.3	us-east-2c	vpc-04791123e8a890d1

At the bottom of the page, there are links for "Feedback", "English (US)", "Privacy Policy", and "Terms of Use".

Click on the “Create endpoint” button.

The screenshot shows the AWS DMS Endpoints page. On the left, there's a sidebar with navigation links like Dashboard, Database migration tasks, Replication instances, Endpoints (which is selected and highlighted in orange), Certificates, Subnet groups, Events, and Event subscriptions. Below the sidebar, there are "What's new" and "Notifications" sections. The main content area has a header "Endpoints" with a search bar and a "Create endpoint" button. A red arrow points to the "Create endpoint" button. Below the header, it says "Empty endpoint table" and "You don't have any endpoints." At the bottom of the page, there are links for Feedback, English (US), Privacy Policy, and Terms of Use.

"Source endpoint" should already be selected by default. Click the checkbox next to "Select RDS DB instance". Then under "RDS Instance", select the RDS instance to be migrated. In this example, it's the instance named "stillman-dms-sky" mentioned earlier. Notice the "Endpoint identifier" field under "Endpoint configuration" is auto-populated.

The screenshot shows the "Create endpoint" wizard. It starts with the "Endpoint type" step. Under "Source endpoint", there's a description: "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." There's also a "Target endpoint" section with a description: "A target endpoint allows AWS DMS to write data to a database, or to other data source." Below this, there's a checked checkbox "Select RDS DB instance" with a red arrow pointing to it. A dropdown menu labeled "RDS Instance" shows "stillman-dms-sky" selected, which is also highlighted with a red box. The next step is "Endpoint configuration", which includes fields for "Endpoint identifier" (set to "stillman-dms-sky") and "Friendly ARN name" (set to "Friendly-ARN-name").

Scroll down and complete the “Endpoint configuration”. Under “Source engine”, select “MySQL” (or whatever engine the source endpoint is) if it isn’t already. Under “Access to endpoint database”, select the correct option. For this demonstration, “Provide access information manually” was selected. Since an RDS instance was chosen as the source, “Server name”, “Port”, and “User name” were auto-populated. Enter the password at “Password”.

The screenshot shows the AWS DMS Endpoint configuration page. On the left sidebar, under the 'Endpoints' section, the 'Provide access information manually' option is selected. In the main configuration area, the 'Source engine' dropdown is set to 'MySQL'. The 'Access to endpoint database' section has the 'Provide access information manually' radio button selected. The 'User name' field contains 'admin' and the 'Password' field contains a masked password. The 'Server name', 'Port', and 'Secure Socket Layer (SSL) mode' fields are also visible.

Configuration is complete and the endpoint can be tested. Continue scrolling down. At the bottom of the endpoints page, click on “Test endpoint connection (optional)” to open the endpoint testing configuration. Select the “VPC” and “Replication instance” to test. Next, click “Run test”. This will create the endpoint and test. If the test is successful, continue. If the test is unsuccessful, it is most likely that the replication instance’s “Private IP address” noted earlier needs to be granted access in the RDS instance’s security group. More information can be found here: <https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/Overview.RDSSecurityGroups.html>.

The screenshot shows the 'AWS DMS' interface with the 'Endpoints' section selected. A red arrow points from the 'Run test' button to the 'Test endpoint connection (optional)' section. Another red arrow points from the 'Run test' button to the 'Run test' button itself.

AWS DMS

Dashboard

Database migration tasks

Replication instances

Endpoints

Certificates

Subnet groups

Events

Event subscriptions

What's new 10

Notifications

Tags

Test endpoint connection (optional)

VPC
vpc-04791123e8a890d1e

Replication instance
A replication instance performs the database migration
rds-skysql-repl-inst

⚠ 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
No records found			

Cancel Create endpoint

Feedback English (US) ▾

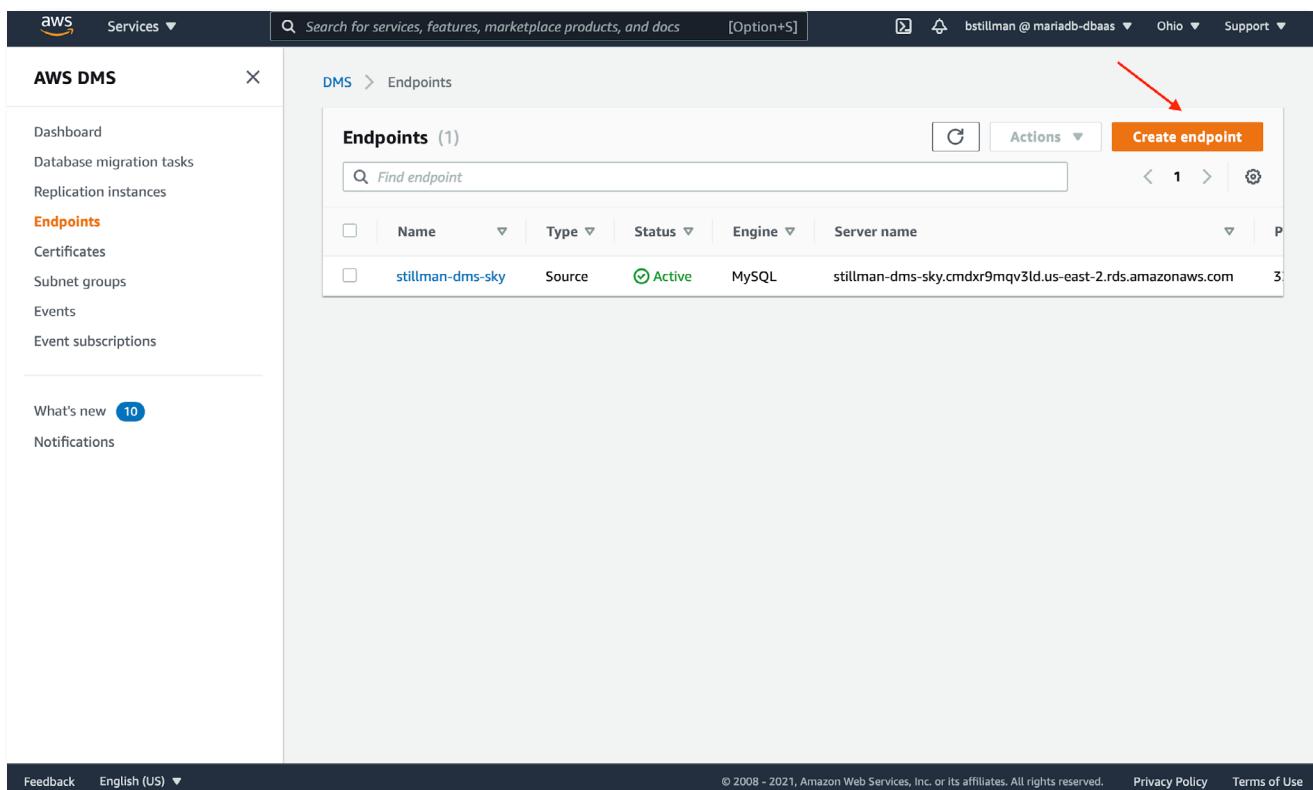
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[Privacy Policy](#) [Terms of Use](#)

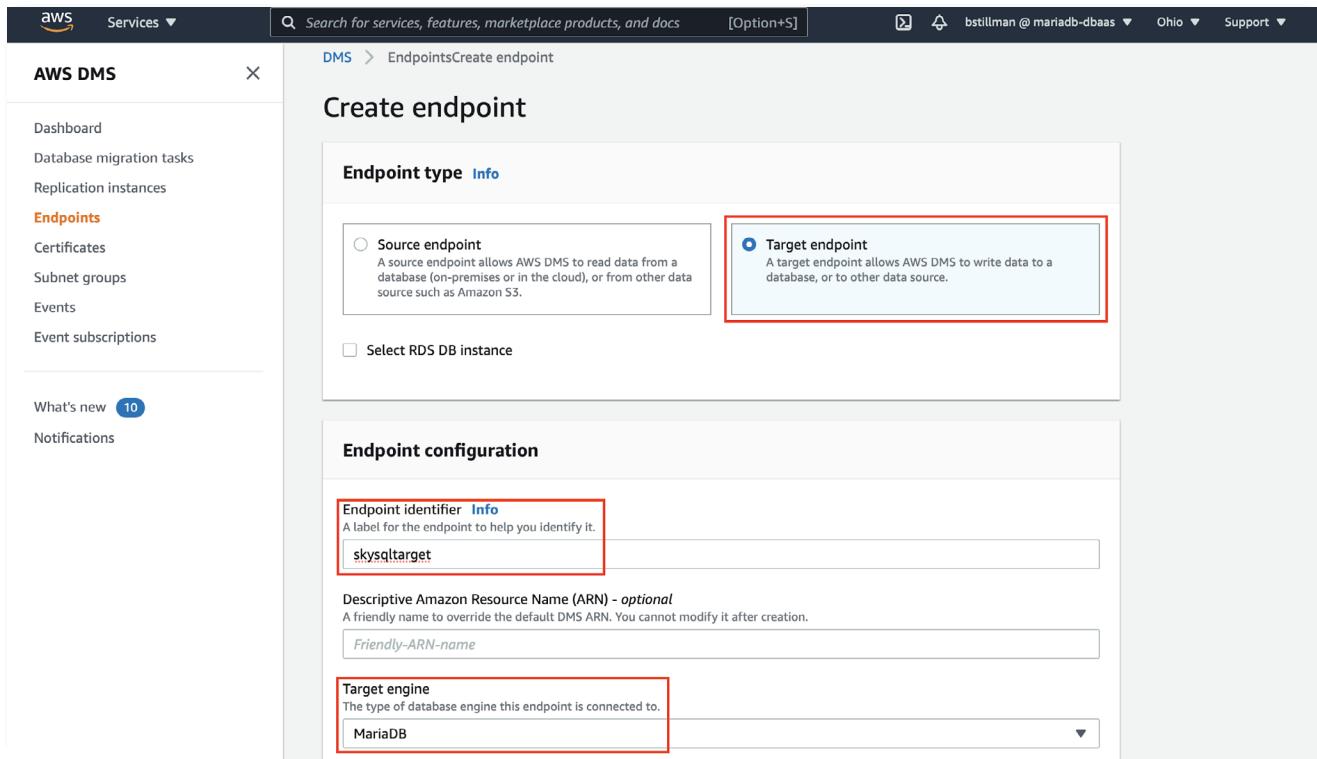
CREATE SKYSQL TARGET ENDPOINT

Next, the Target Endpoint needs to be created.

Click the “Create endpoint” button.



Select “Target endpoint”. Enter a descriptive “Endpoint identifier”. Choose “MariaDB” as the “Target engine”.



Scroll down to complete the configuration.

- Under “Access to endpoint database”, select “Provide access information manually”.
- For “Server name”, enter the “Fully Qualified Domain Name” from the SkySQL service.
- “Port” is the “Read-Write Port” from the SkySQL service.
- Select “verify-ca” under “Secure Socket Layer (SSL) mode”.
- Click “Add new CA certificate”.
- Upload the “Certificate authority chain” from SkySQL.
- Now “skysql-chain” should be available to select in the “CA certificate” drop-down.
- Lastly, enter the “User name” and “Password” for the SkySQL service.

AWS DMS

Friendly-ARN-name

Target engine: MariaDB

Access to endpoint database:

- Choose AWS Secrets Manager
- Provide access information manually

Server name: rds-migration-example.mdb0001941.db.skysql.net

Port: 5001

Secure Socket Layer (SSL) mode: verify-ca

CA certificate: skysql-chain

User name: DB00003785

Password: [REDACTED]

Endpoint-specific settings

KMS master key

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Configuration is complete and the endpoint can be tested. Continue scrolling down. At the bottom of the "Endpoints" page, click on "Test endpoint connection (optional)" to expand the testing configuration. Select the correct "VPC" and "Replication instance". Then click the "Run test" button. This will create the endpoint and test. If the test is successful, continue. If the test is unsuccessful, it is most likely that the replication instance's "Public IP address" noted earlier needs to be whitelisted in the SkySQL service. More information can be found here: <https://mariadb.com/products/skysql/docs/instructions/ip-whitelist-services/>.

AWS DMS

Tags

▼ Test endpoint connection (optional)

VPC: vpc-04791123e8a890d1e

Replication Instance: rds-skysql-repl-inst

⚠ 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

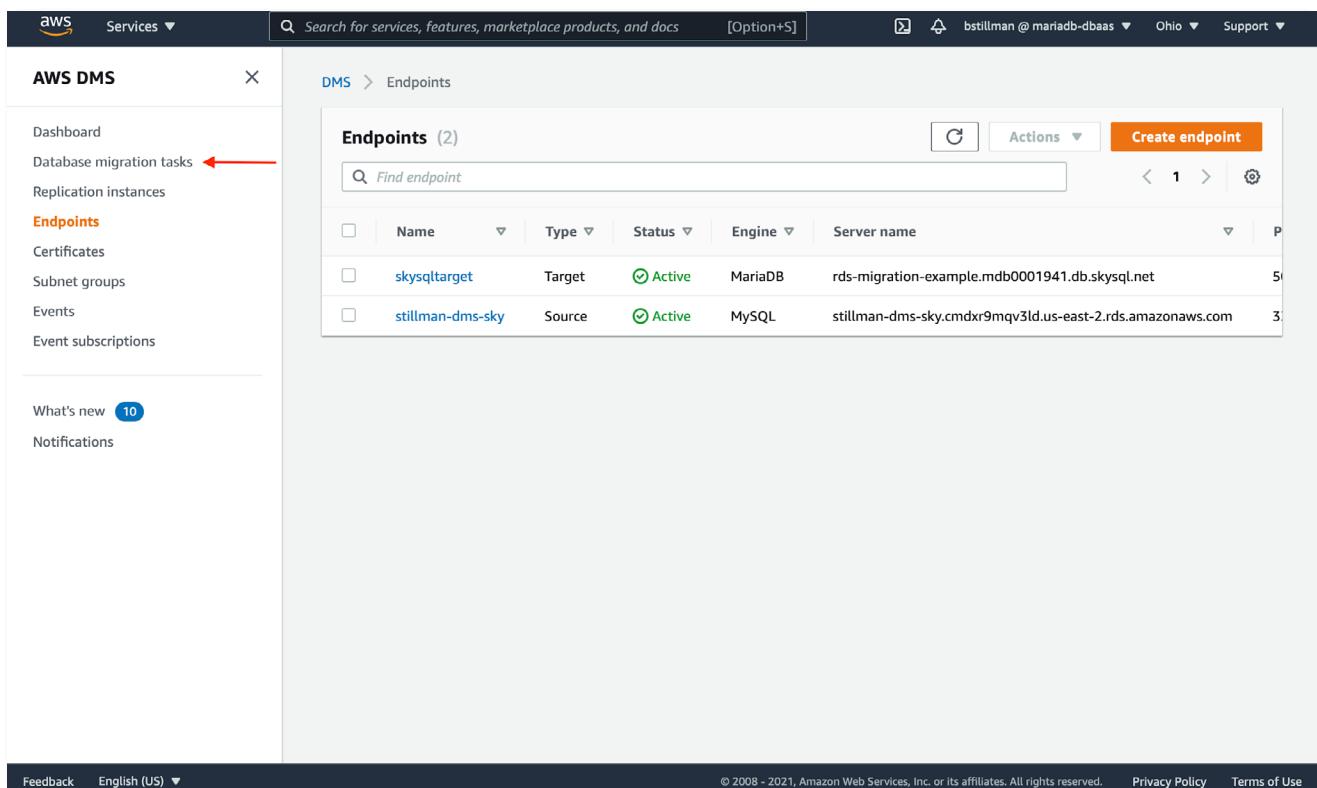
Endpoint identifier	Replication instance	Status	Message
No records found			

Create endpoint

CREATE AWS DMS DATABASE REPLICATION TASK

Next, create the "Database replication task".

Click on "Database replication tasks" in the navigation menu on the left side.



The screenshot shows the AWS DMS console interface. On the left, there is a sidebar with the following navigation options:

- Dashboard
- Database migration tasks** (highlighted with a red arrow)
- Replication instances
- Endpoints** (highlighted in orange)
- Certificates
- Subnet groups
- Events
- Event subscriptions

Below the sidebar, there are two notifications:

- What's new (10)
- Notifications

The main content area is titled "Endpoints (2)". It contains a table with the following data:

	Name	Type	Status	Engine	Server name	Actions
<input type="checkbox"/>	skysqltarget	Target	Active	MariaDB	rds-migration-example.mdb0001941.db.skysql.net	
<input type="checkbox"/>	stillman-dms-sky	Source	Active	MySQL	stillman-dms-sky.cmdxr9mqv3ld.us-east-2.rds.amazonaws.com	

Click the “Create task” button.

The screenshot shows the AWS DMS console with the 'Database migration tasks' page selected. The left sidebar includes links for Dashboard, Database migration tasks (which is highlighted in orange), Replication instances, Endpoints, Certificates, Subnet groups, Events, and Event subscriptions. Below the sidebar are 'What's new' (10 notifications) and 'Notifications' sections. The main content area displays a table titled 'Database migration tasks' with columns for Identifier, Status, Progress, Type, Source, Target, Replication instance, and Started. A search bar at the top of the table says 'Find database migration tasks'. At the bottom right of the table, there is a 'Create' button. The top navigation bar includes the AWS logo, Services dropdown, a search bar, and account information (bstillman @ mariadb-dbaas, Ohio, Support).

Enter a descriptive “Task identifier”. Select the correct “Replication instance”, “Source database endpoint”, “Target database endpoint”, and “Migration type”. For this demonstration, this migration will be “Migrate existing data and replicate ongoing changes”. This does a bulk load of existing data and replicates any further changes to the SkySQL service.

The screenshot shows the 'Create database migration task' configuration page. The left sidebar is identical to the previous screenshot. The main form is titled 'Create database migration task' and contains a 'Task configuration' section. The 'Task identifier' field is filled with 'rds-skysql-replication-task' and has a red box around it. Below it is a 'Descriptive Amazon Resource Name (ARN) - optional' field with a placeholder 'Friendly-ARN-name' and a red box around it. The 'Replication instance' dropdown is set to 'rds-skysql-repl-inst - vpc-04791123e8a890d1e' and has a red box around it. The 'Source database endpoint' dropdown is set to 'stillman-dms-sky' and has a red box around it. The 'Target database endpoint' dropdown is set to 'skysqltarget' and has a red box around it. The 'Migration type' dropdown is set to 'Info' and has a red box around it. At the bottom of the form, a note states: 'Your source database is MySQL. Replicating ongoing changes requires the MySQL binary log to be enabled and...' with a red box around the note area. The bottom navigation bar includes 'Feedback', 'English (US)', and links to 'Privacy Policy' and 'Terms of Use'.

Note the warning presented. This should have already been completed during the "Configure the RDS Instance" step, thus safe to ignore.

The screenshot shows the AWS DMS console with a migration task configuration. The left sidebar lists options like Dashboard, Database migration tasks (which is selected), Replication instances, Endpoints, Certificates, Subnet groups, Events, Event subscriptions, What's new (with 10 notifications), and Notifications. The main area shows the Source database endpoint set to 'stillman-dms-sky' and the Target database endpoint set to 'skysqltarget'. The Migration type is set to 'Migrate existing data and replicate ongoing changes'. A prominent red box highlights a warning message: 'Your source database is MySQL. Replicating ongoing changes requires the MySQL binary log to be enabled and set to row. Please ensure your binary logs are retained on the server for a sufficient amount of time, (24 hours is usually enough.) To set your binary log retention time on RDS instances you can use the following command: call mysql.rds_set_configuration("binlog retention hours", 24);'. Below this, the 'Task settings' section shows 'Editing mode' with 'Wizard' selected (radio button is checked) and a note: 'You can enter only a subset of the available task settings.' It also shows 'Custom CDC stop mode for source transactions' with 'Disable custom CDC stop mode' selected (radio button is checked). The bottom of the page includes standard AWS footer links: Feedback, English (US), © 2008 - 2021, Amazon Web Services, Inc. or its affiliates. All rights reserved., Privacy Policy, and Terms of Use.

Continue scrolling down to continue configuring. Select "Wizard" for "Editing mode". Select "Disable custom CDC stop mode". Click the checkbox for "Create recovery table on target DB". For "Target table preparation mode", select the best option. For this demonstration, "Do nothing" was selected as the database to be migrated does not contain any data in the SkySQL service. Under "Stop task after full load completes", select "Don't stop". Under "Include LOB columns in replication", select the best option. For this demonstration, "Full LOB mode" was chosen although no LOBs are in the database to be migrated.

AWS DMS

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.

Custom CDC stop mode for source transactions [Info](#)

Disable custom CDC stop mode

Enable custom CDC stop mode

Create recovery table on target DB ←

Target table preparation mode [Info](#)

Do nothing

Drop tables on target

Truncate

Stop task after full load completes [Info](#)

Don't stop

Stop before applying cached changes

Stop after applying cached changes

Include LOB columns in replication [Info](#)

Don't include LOB columns

Full LOB mode

Limited LOB mode

LOB chunk size (kb)

Feedback English (US) ▾

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Scroll down to the "Table mappings" section. Select "Wizard" for "Editing mode". Now create a "Selection rule". For this demonstration, a database or schema named "testing" and all tables within will be included for migration.

AWS DMS

Table mappings

Editing mode [Info](#)

Wizard
You can enter only a subset of the available table mappings.

JSON editor
You can enter all available table mappings directly in JSON format.

Specify at least one selection rule with an include action. After you do this, you can add one or more transformation rules.

▼ Selection rules

Choose the schema and/or tables you want to include with, or exclude from, your migration task. [Info](#)

Add new selection rule

▼ where schema name is like 'mysql' and table name is like '%'; include

Schema

Enter a schema

Schema name
Use the % character as a wildcard

testing

Table name
Use the % character as a wildcard

%

Action
Choose "Include" to migrate your selected objects, or "Exclude" to ignore them during the migration.

Include

Feedback English (US) ▾

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Scroll down to the bottom of the page. Under "Migration task startup configuration", select "Manually later". Then click the "Create task" button.

The screenshot shows the AWS DMS console with the following details:

- Left sidebar:** AWS DMS, Services, Dashboard, Database migration tasks (highlighted in orange), Replication instances, Endpoints, Certificates, Subnet groups, Events, Event subscriptions, What's new (10 notifications).
- Main content area:**
 - 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.
 - Migration task startup configuration:** Start migration task
 - Automatically on create (Available only if the premigration assessment is not enabled.)
 - Manually later (highlighted with a red box)
 - Tags:** (empty)
- Bottom right:** Cancel, Create task (highlighted with a red arrow).

While the "replication task" is being created, verify the data within the RDS database to be migrated. For this demonstration, there is one table named "TableA" in the database named "testing".

```
SELECT COUNT(*) FROM testing.TableA;
+-----+
| COUNT(*) |
+-----+
| 14017096 |
+-----+
```

Once the replication task's "Status" reports "Ready", check the checkbox next to the service. Then click "Actions", and then "Restart/Resume" to start the task.

The screenshot shows the AWS DMS console with the 'Database migration tasks' page. A red arrow points from the left margin to the 'Status' column header in the table. Another red arrow points from the right margin to the 'Actions' menu. The table lists one task:

Identifier	Status	Progress
rds-skysql-replication-task	Ready	0%

The 'Actions' menu for this task includes options: Create premigration assessment, Modify, Move, Restart/Resume, Stop, and Delete.

The replication task's "Status" should now report "Running", and the "Progress" should be reporting. This can take a considerable amount of time depending on the size of the data to be migrated.

The screenshot shows the AWS DMS console with the 'Database migration tasks' page. A red arrow points from the left margin to the 'Status' column header in the table. Another red arrow points from the right margin to the 'Progress' column header. The table lists one task:

Identifier	Status	Progress	Type	Source	Target
rds-skysql-replication-task	Running	38%	Full load, ongoing replication	stillman-dms-sky	skysqltarget

Once the initial bulk data load is complete, the "Status" should change to "Load complete, replication ongoing".

The screenshot shows the AWS DMS console with the left sidebar expanded. Under 'Database migration tasks', a single task named 'rds-skysql-replication-task' is listed. The 'Status' column for this task is highlighted with a red box and contains the text 'Load complete, replication ongoing'. Other columns show 'Progress' at 100% and 'Type' as 'Full load, ongoing replication'.

Verify on the SkySQL service that the database and table has been migrated successfully.

```
SELECT COUNT(*) FROM testing.TableA;
+-----+
| COUNT(*) |
+-----+
| 14017096 |
+-----+
```

This matches the results from the RDS instance.

Now verify additional changes on the RDS instance are migrated to the SkySQL service by inserting a record into the table.

```
INSERT INTO testing.TableA (uuid_junk) VALUES ('ccaae845-6c9e-11eb-bf8d-06676091bc04');
```

Verify that record now exists in the SkySQL service.

```
SELECT uuid_junk FROM testing.TableA
WHERE uuid_junk = 'ccaae845-6c9e-11eb-bf8d-06676091bc04';
```

```
+-----+  
| uuid_junk  
| +-----+  
| ccaae845-6c9e-11eb-bf8d-06676091bc04 |  
+-----+
```

AWS DMS has been successfully set up and is migrating any changes to the RDS instance to the SkySQL service. At this point, the application using the RDS instance can now be tested against real, live data on the SkySQL instance and cutover can be scheduled.

TESTING AND VALIDATION

Through the successful completion of this migration process, a second copy of the data in AWS RDS has been established on MariaDB SkySQL. This process is repeatable, which enables teams to perform a range of data validation and application testing before performing application migration.