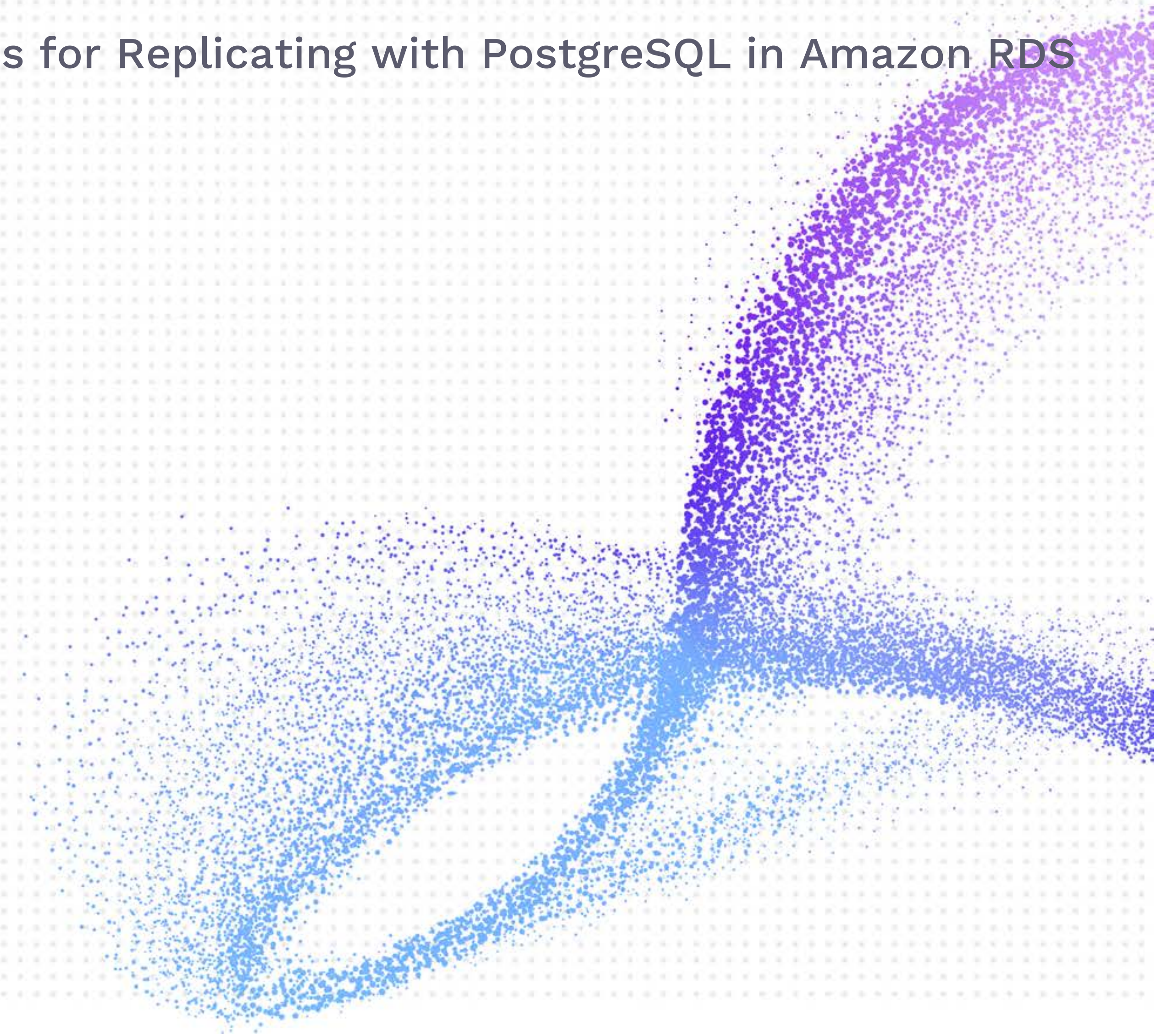
Syniti Replicate

Setup Notes for Replicating with PostgreSQL in Amazon RDS

Version 10.2



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Syniti Replicate

These notes provide essential information for setting up replications using **Amazon RDS for PostgreSQL**. The setup process for a refresh replication can usually be completed using the Syniti Replicate wizards without additional documentation because it does not involve access to the PostgreSQL log. For complete details on the setup process, check the *Syniti Replicate User Guide* available from the Management Center **Help** menu or the *Syniti Replicate Setup Guide*, available for download in the Help Center.

This guide describes the setup process using the Log Server Agent option for one-way mirroring and synchronization when replicating data from a PostgreSQL database. For mirroring and synchronization replications using PostgreSQL as a source, Syniti Replicate offers:

- **Log Server Agent**: Uses a Windows service and a Log Server component to query the PostgreSQL log for increased performance when dealing with large amounts of data.

Connection Type

PostgreSQL .NET Data Provider recommended by PostgreSQL

Assembly: Npgsql (file name: Npgsql.dll)

Sample path: C:\Npgsql-2.2.3-net40\Npgsql.dll

The provider version number stored in the DBReplicator.exe.config file (in the Syniti Replicate hyper folder) should match the provider version that you are using. To change the version of the provider, specify the "newVersion" in the DBReplicator.exe.config file as follows:

```
<dependentAssembly>
  <assemblyIdentity name="Npgsql" publicKeyToken="5d8b90d52f46fda7"
culture="neutral"></assemblyIdentity>
  <bindingRedirect oldVersion="2.2.3.0" newVersion="2.2.3.0"></bindingRedirect>
</dependentAssembly>
```

PostgreSQL System Settings

Syniti Replicate supports PostgreSQL versions 9.5 and above as a source database for mirroring. It takes advantage of the PostgreSQL replication slot feature by requiring that every connection to PostgreSQL from Syniti Replicate use a dedicated replication slot. The PostgreSQL documentation provides an in-depth explanation of replication slots, but briefly, a single slot represents an ordered stream of changes that occur on a specific database on the origin server. Note that if you enable a replication slot from Syniti Replicate without using it, the slot will consume resources and prevent the database cleanup functionality to purge old records from the transaction log, because they do not appear as consumed by an existing slot. Therefore, it is important to remove replication slots from the database by removing the Syniti Replicate connection if it is not used in replication.

Amazon RDS for PostgreSQL Database Setup

To set up the Amazon RDS for PostgreSQL database as a source for transactional replications (CDC) in Syniti Replicate, use the following link for detailed instructions.

https://docs.aws.amazon.com/dms/latest/userguide/CHAP_Source.PostgreSQL.html#CHAP_Source.PostgreSQL.RDSPostgreSQL

Specifically, make sure you following the steps in these sections:

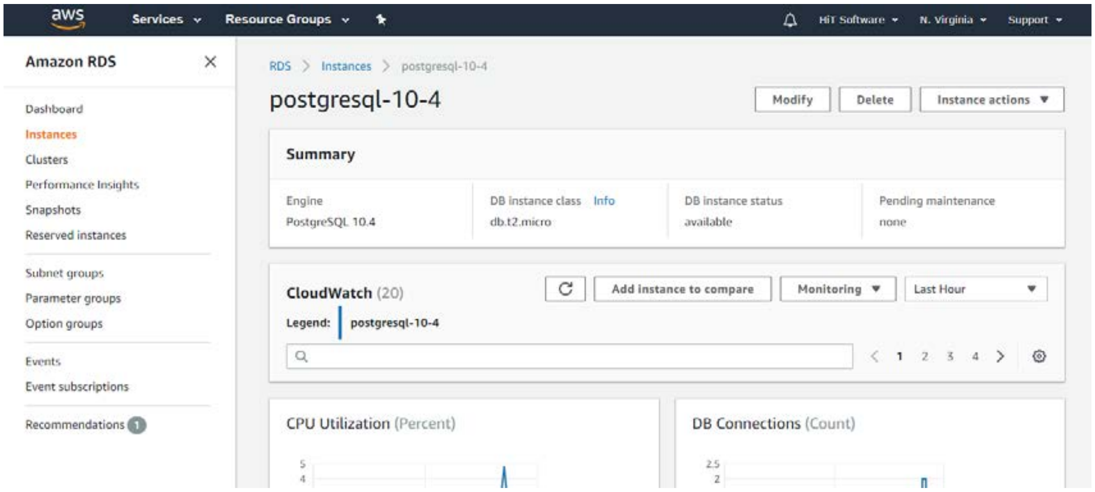
- Prerequisites for Using a PostgreSQL Database as a Source for AWS DMS
- Setting Up an Amazon RDS PostgreSQL DB Instance as a Source (Using CDC with an RDS for PostgreSQL DB Instance section)

Once you have reviewed and completed the above instructions, follow the steps below.

Setting up PostgreSQL RDS for Logical Replication

Here is a step-by-step guide to setting up using the Amazon RDS Console:

1. Log in to aws.amazon.com and go to the RDS database instance that you have created.



postgresql-10-4

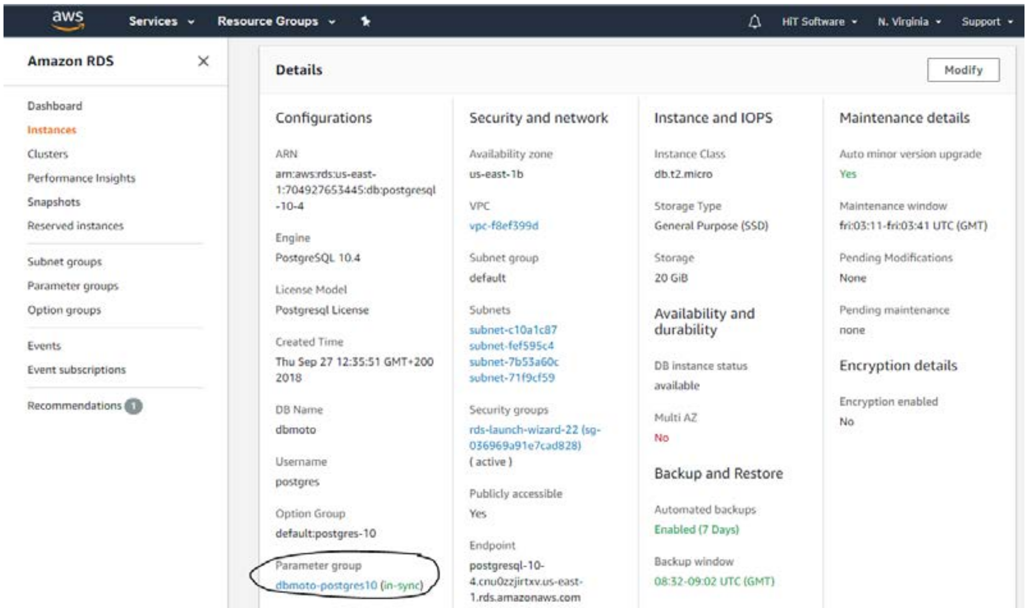
Summary

Engine	DB instance class Info	DB instance status	Pending maintenance
PostgreSQL 10.4	db.t2.micro	available	none

CloudWatch (20)

Legend: postgresql-10-4

2. Scroll down to the *Details/Configuration* section of your instance and take note of the *Parameter Group* used for your RDBMS:



Details

Configurations

ARN: arn:aws:rds:us-east-1:704927653445:db:postgresql-10-4

Engine: PostgreSQL 10.4

License Model: Postgresql License

Created Time: Thu Sep 27 12:35:51 GMT+200 2018

DB Name: dbmoto

Username: postgres

Option Group: default:postgres-10

Parameter group: dbmoto-postgres10 (in-sync)

Security and network

Availability zone: us-east-1b

VPC: vpc-f8ef399d

Subnet group: default

Subnets: subnet-c10a1c87
subnet-fef595c4
subnet-7b53a60c
subnet-71f9cf59

Security groups: rds-launch-wizard-22 (sg-036969a91e7cad828) (active)

Publicly accessible: Yes

Endpoint: postgresql-10-4.cnu0zzjirtxv.us-east-1.rds.amazonaws.com

Instance and IOPS

Instance Class: db.t2.micro

Storage Type: General Purpose (SSD)

Storage: 20 GiB

Availability and durability

DB instance status: available

Multi AZ: No

Backup and Restore

Automated backups: Enabled (7 Days)

Backup window: 08:32-09:02 UTC (GMT)

Maintenance details

Auto minor version upgrade: Yes

Maintenance window: fri:03:11-fri:03:41 UTC (GMT)

Pending Modifications: None

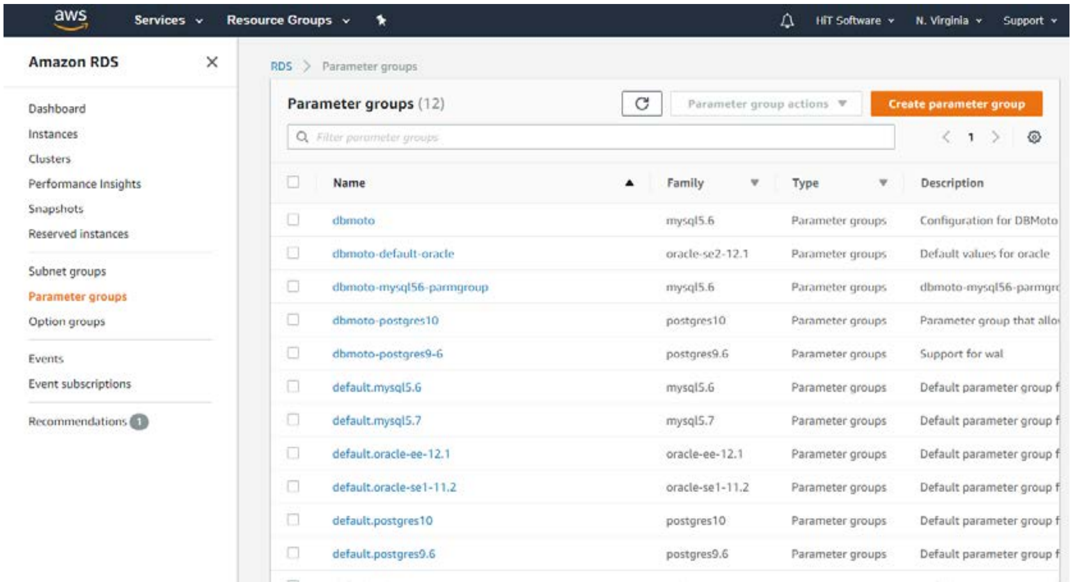
Pending maintenance: none

Encryption details

Encryption enabled: No

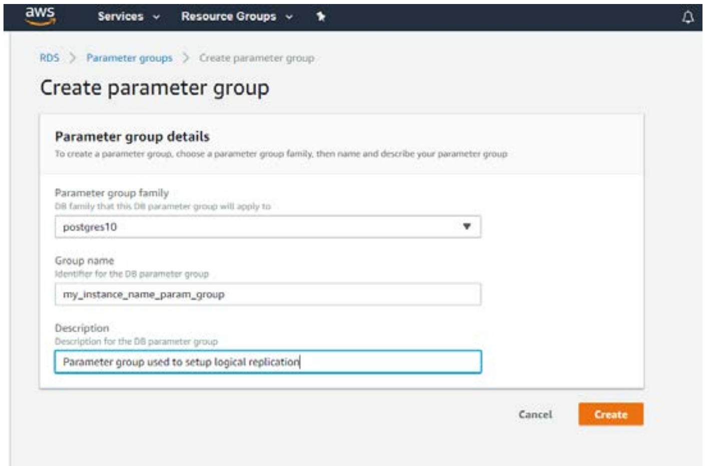
Normally, when an instance is initially created, RDS will configure a set of parameters by assigning a ***Default Parameter Group*** to the instance. A default parameter group is a set of database parameters that is standard and is the same for all instances of that DB type. To customize your parameter settings (as required to enable transactional replications in Syniti Replicate), create a ***Custom Parameter Group*** and assign it to the instance.

3. Select **Parameter Groups** from the menu bar on the left.
   A list of parameter groups will be shown:



	Name	Family	Type	Description
□	dbmoto	mysql5.6	Parameter groups	Configuration for DBMoto
□	dbmoto-default-oracle	oracle-se2-12.1	Parameter groups	Default values for oracle
□	dbmoto-mysql56-parmgroup	mysql5.6	Parameter groups	dbmoto-mysql56-parmgr
□	dbmoto-postgres10	postgres10	Parameter groups	Parameter group that allo
□	dbmoto-postgres9-6	postgres9.6	Parameter groups	Support for wal
□	default.mysql5.6	mysql5.6	Parameter groups	Default parameter group f
□	default.mysql5.7	mysql5.7	Parameter groups	Default parameter group f
□	default.oracle-ee-12.1	oracle-ee-12.1	Parameter groups	Default parameter group f
□	default.oracle-se1-11.2	oracle-se1-11.2	Parameter groups	Default parameter group f
□	default.postgres10	postgres10	Parameter groups	Default parameter group f
□	default.postgres9.6	postgres9.6	Parameter groups	Default parameter group f

4. Click **Create Parameter Group** to create a custom group. In the process, make sure you select the correct type of parameter group by indicating the type of database (PostgreSQL) and the version that your instance is running:



Create parameter group

Parameter group details

To create a parameter group, choose a parameter group family, then name and describe your parameter group

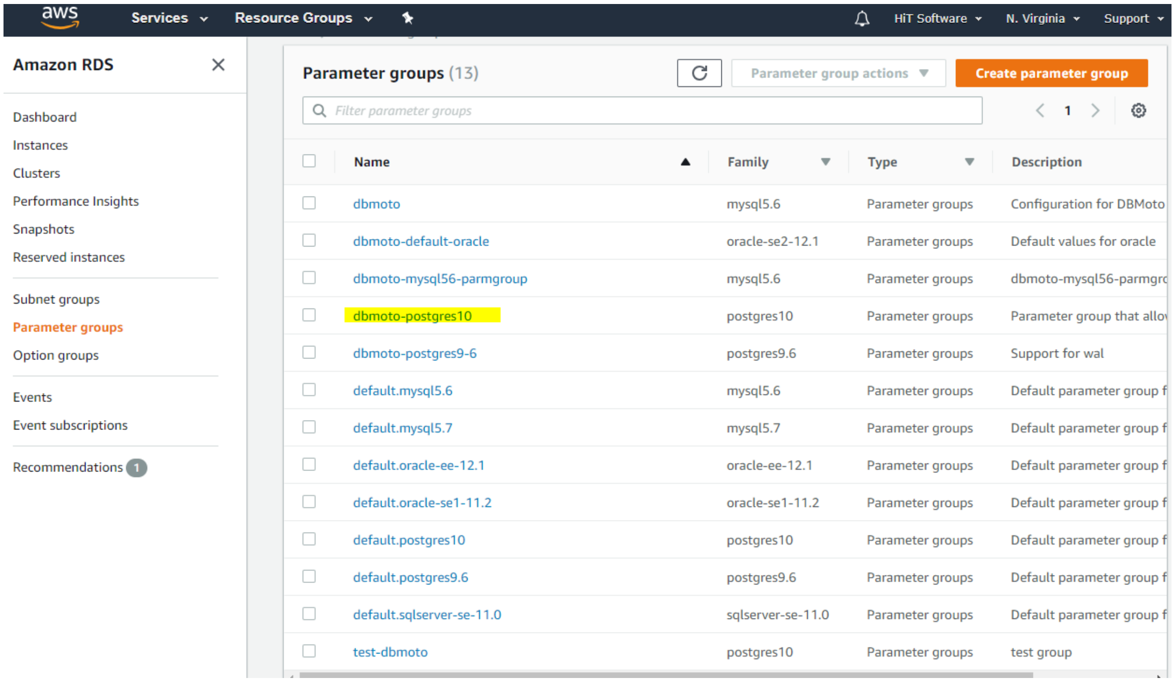
Parameter group family
DB family that this DB parameter group will apply to
postgres10

Group name
Identifier for the DB parameter group
my_instance_name_param_group

Description
Description for the DB parameter group
Parameter group used to setup logical replication

Once the group is created, edit its properties to allow logical replication.

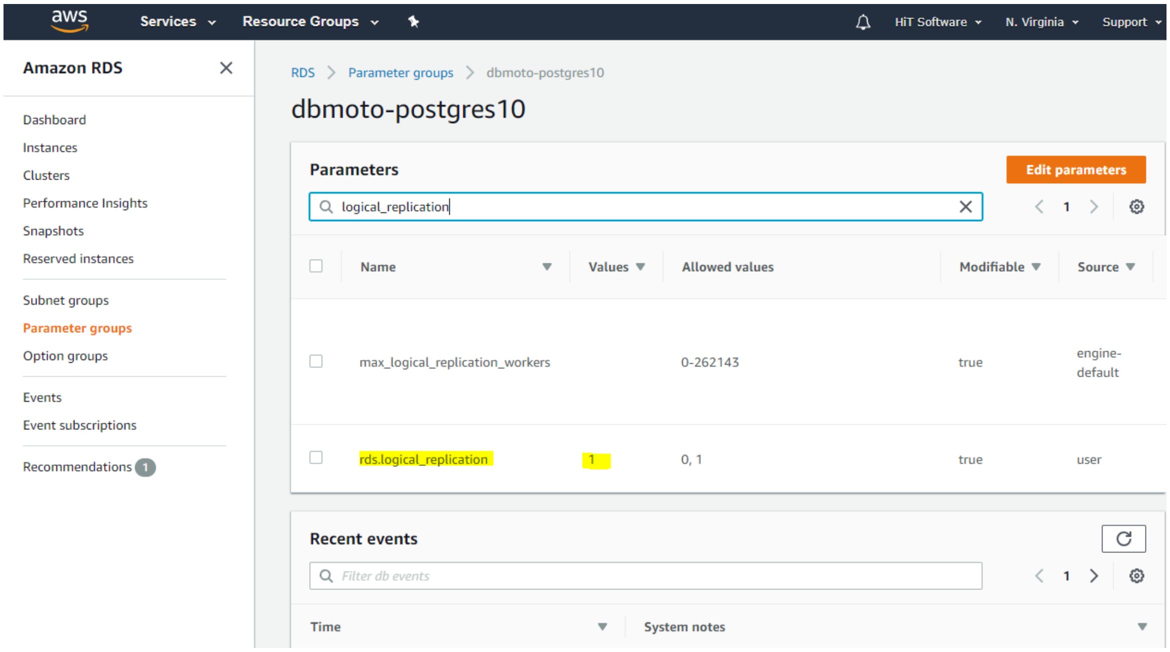
5. Back in the **Parameter Groups** page, select the new group:



Parameter groups (13)

Name	Family	Type	Description
dbmoto	mysql5.6	Parameter groups	Configuration for DBMoto
dbmoto-default-oracle	oracle-se2-12.1	Parameter groups	Default values for oracle
dbmoto-mysql56-parmgroup	mysql5.6	Parameter groups	dbmoto-mysql56-parmgro
dbmoto-postgres10	postgres10	Parameter groups	Parameter group that allo
dbmoto-postgres9-6	postgres9.6	Parameter groups	Support for wal
default.mysql5.6	mysql5.6	Parameter groups	Default parameter group f
default.mysql5.7	mysql5.7	Parameter groups	Default parameter group f
default.oracle-ee-12.1	oracle-ee-12.1	Parameter groups	Default parameter group f
default.oracle-se1-11.2	oracle-se1-11.2	Parameter groups	Default parameter group f
default.postgres10	postgres10	Parameter groups	Default parameter group f
default.postgres9.6	postgres9.6	Parameter groups	Default parameter group f
default.sqlserver-se-11.0	sqlserver-se-11.0	Parameter groups	Default parameter group f
test-dbmoto	postgres10	Parameter groups	test group

6. Search for the property called *logical_replication*, edit it and set its value to 1:



dbmoto-postgres10

Parameters

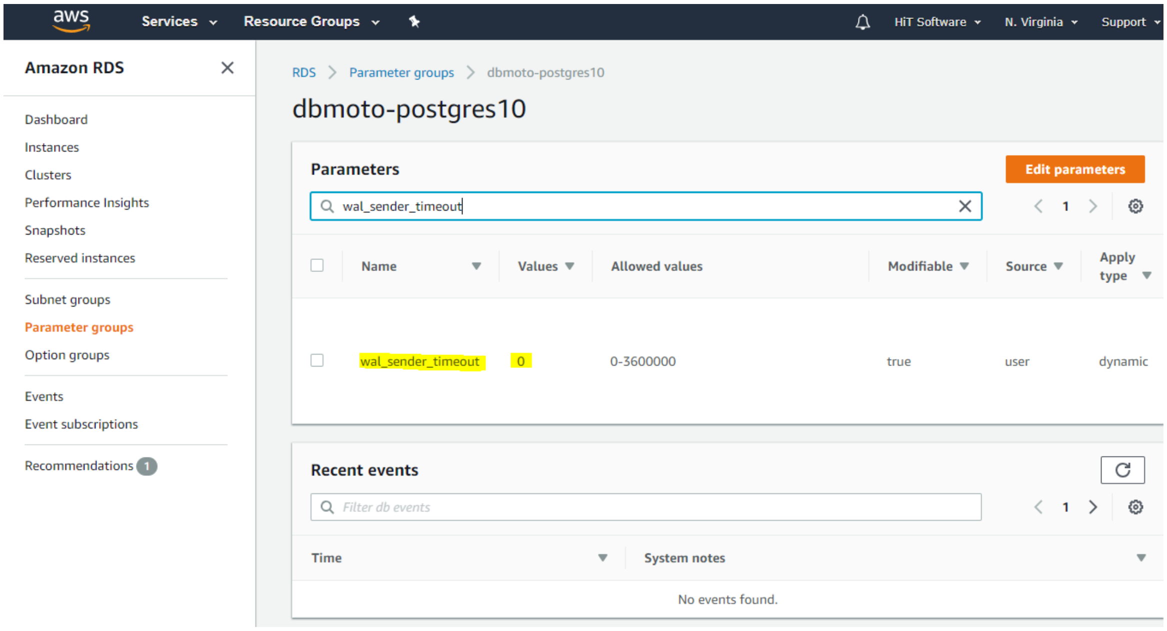
logical_replication

Name	Values	Allowed values	Modifiable	Source
max_logical_replication_workers		0-262143	true	engine-default
rds.logical_replication	1	0, 1	true	user

Recent events

Time	System notes

7. Now search for *wal_sender_timeout* and set it to 0:



dbmoto-postgres10

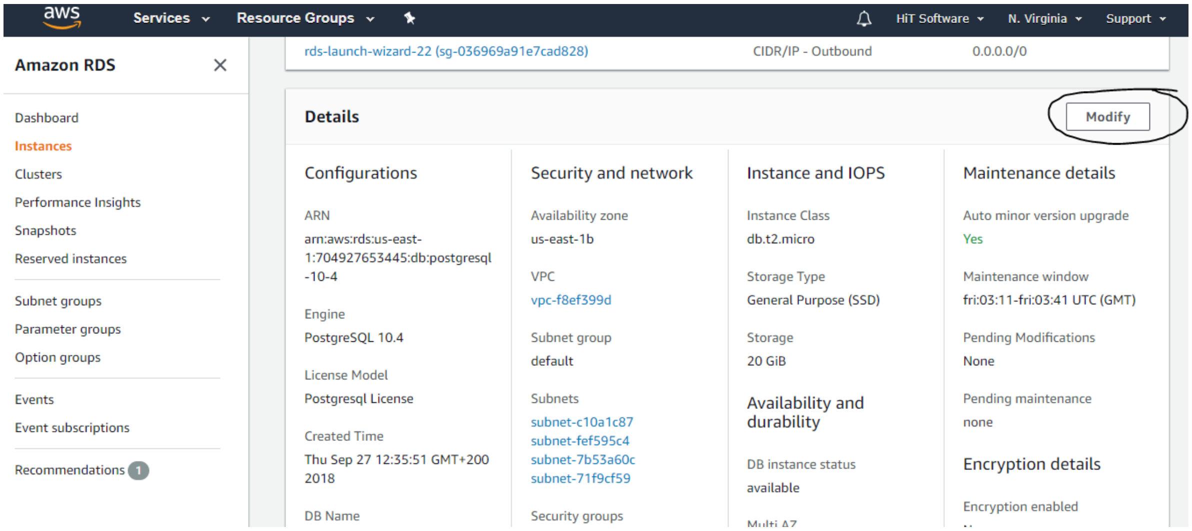
Parameters

wal_sender_timeout

□	Name	Values	Allowed values	Modifiable	Source	Apply type
□	wal_sender_timeout	0	0-3600000	true	user	dynamic

Time	System notes
No events found.	

8. Go back to your instance, **Details** section and click **Modify**:



rds-launch-wizard-22 (sg-036969a91e7cad828) CIDR/IP - Outbound 0.0.0.0/0

Details

Configurations

ARN
arn:aws:rds:us-east-1:704927653445:db:postgresql-10-4

Engine
PostgreSQL 10.4

License Model
Postgresql License

Created Time
Thu Sep 27 12:35:51 GMT+200 2018

DB Name

Security and network

Availability zone
us-east-1b

VPC
vpc-f8ef399d

Subnet group
default

Subnets
subnet-c10a1c87
subnet-fef595c4
subnet-7b53a60c
subnet-71f9cf59

Security groups

Instance and IOPS

Instance Class
db.t2.micro

Storage Type
General Purpose (SSD)

Storage
20 GiB

Availability and durability

DB instance status
available

Multi AZ

Maintenance details

Auto minor version upgrade
Yes

Maintenance window
fri:03:11-fri:03:41 UTC (GMT)

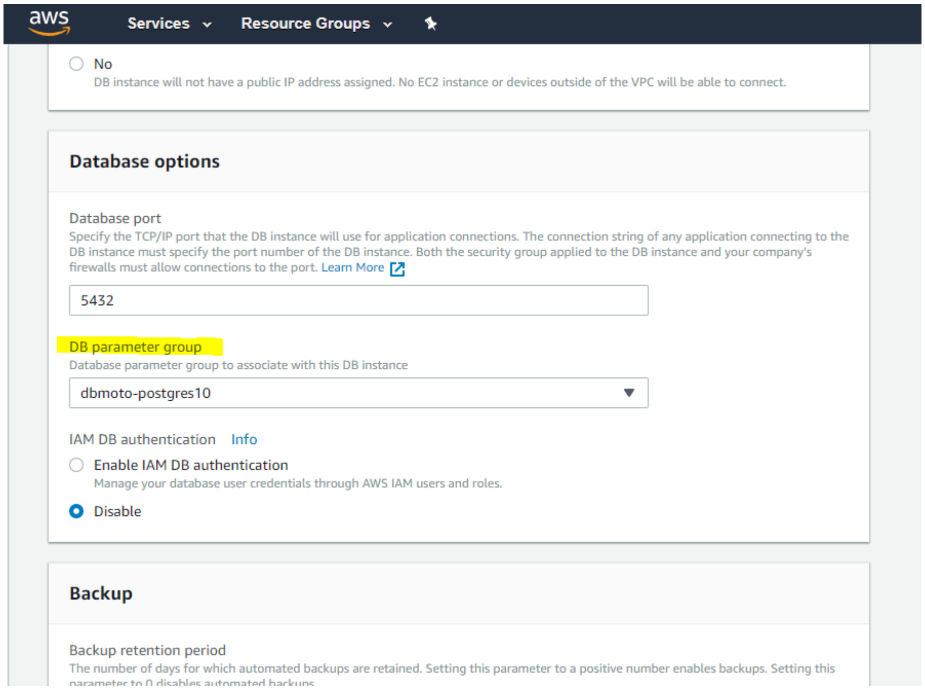
Pending Modifications
None

Pending maintenance
none

Encryption details

Encryption enabled

9. In the editing page, scroll down to the **Database Options** section and select the Custom Parameter Group that you just created:



○ No
DB instance will not have a public IP address assigned. No EC2 instance or devices outside of the VPC will be able to connect.

Database options

Database port
Specify the TCP/IP port that the DB instance will use for application connections. The connection string of any application connecting to the DB instance must specify the port number of the DB instance. Both the security group applied to the DB instance and your company's firewalls must allow connections to the port. Learn More

5432

DB parameter group
Database parameter group to associate with this DB instance

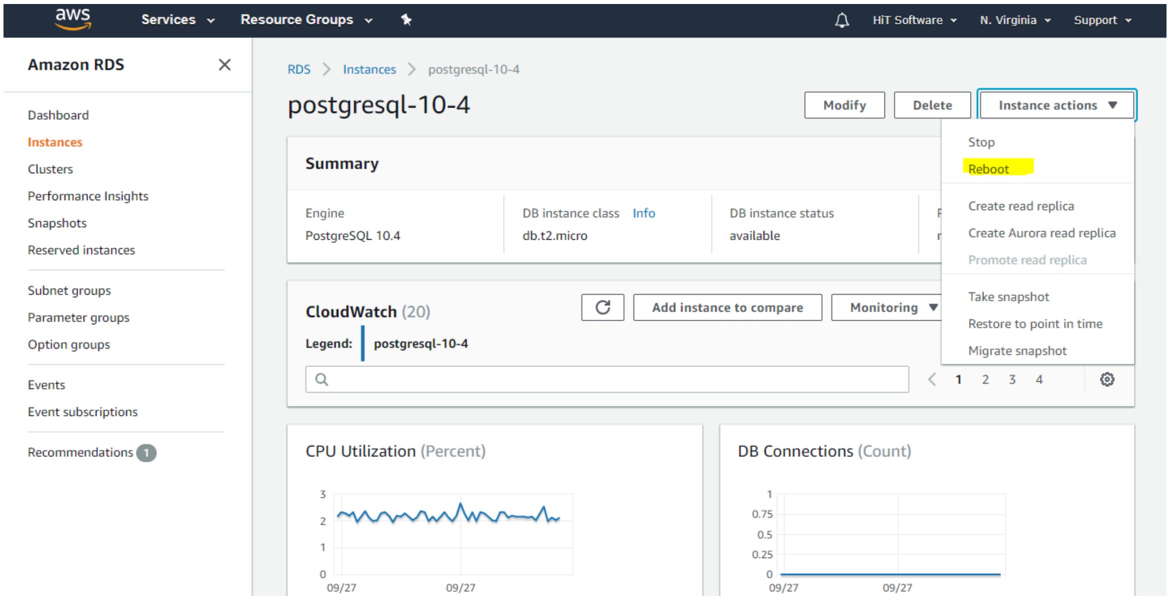
dbmoto-postgres10

IAM DB authentication Info
○ Enable IAM DB authentication
Manage your database user credentials through AWS IAM users and roles.
● Disable

Backup

Backup retention period
The number of days for which automated backups are retained. Setting this parameter to a positive number enables backups. Setting this parameter to 0 disables automated backups

10. Scroll down to the bottom of the page and click **Continue**.
    RDS will then let you save these settings. You can choose the option to save the changes at the next planned maintenance time or immediately. Even if you opt for immediate changes, the database status will be set as unavailable for some time.
11. Once the database is again available, select **Instance Actions** and click **Reboot**. These settings will take effect after the database has been rebooted:



postgresql-10-4

Summary

Engine: PostgreSQL 10.4
DB instance class Info: db.t2.micro
DB instance status: available

CloudWatch (20)
Legend: postgresql-10-4

At this point, PostgreSQL on Amazon RDS is ready to be used from Syniti Replicate and you can start setting up the transactional replication from the Management Center.

Recommendations and Restrictions

There are restrictions on CDC replication using PostgreSQL as a source. Although these are listed in the link Amazon RDS for PostgreSQL database or Amazon AWS documentation below, a subset is repeated here as these restrictions apply specifically to use of PostgreSQL with Syniti Replicate.

Limitations on Using a PostgreSQL Database as a Source for AWS DMS

Limitations on Using a PostgreSQL Database as a Source for AWS DMS

The following limitations apply when using PostgreSQL as a source for AWS DMS:

- A captured table must have a primary key. If a table doesn't have a primary key, AWS DMS ignores DELETE and UPDATE record operations for that table.
- Timestamp with a time zone type column is not supported.
- AWS DMS ignores an attempt to update a primary key segment. In these cases, the target identifies the update as one that didn't update any rows. However, because the results of updating a primary key in PostgreSQL are unpredictable, no records are written to the exceptions table.
- Replication of multiple tables with the same name but where each name has a different case (for example table1, TABLE1, and Table1) can cause unpredictable behavior, and therefore AWS DMS doesn't support it.
- AWS DMS doesn't support change processing of TRUNCATE operations.
- The OID LOB data type is not migrated to the target.
- If your source is an on-premises PostgreSQL database or a PostgreSQL database on an Amazon EC2 instance, ensure that the test_decoding output plugin (found in the Postgres contrib package) is installed on your source endpoint. For more information about the test-decoding plugin, see the PostgreSQL documentation.
- AWS DMS doesn't support replication of partitioned tables. When a partitioned table is detected, the following occurs:
  - The endpoint reports a list of parent and child tables.
  - AWS DMS creates the table on the target as a regular table with the same properties as the selected tables.
  - If the parent table in the source database has the same primary key value as its child tables, a "duplicate key" error is generated.

  Note:
  To replicate partitioned tables from a PostgreSQL source to a PostgreSQL target, you first need to manually create the parent and child tables on the target. Then you define a separate task to replicate to those tables. In such a case, you set the task configuration to **Truncate before loading**.

Excerpt from **AWS Database Migration Service User Guide** (Version API Version 2016-01-01)
https://docs.aws.amazon.com/dms/latest/userguide/CHAP_Source.PostgreSQL.html)

Add Source Connection Wizard

Select Provider Screen

Database

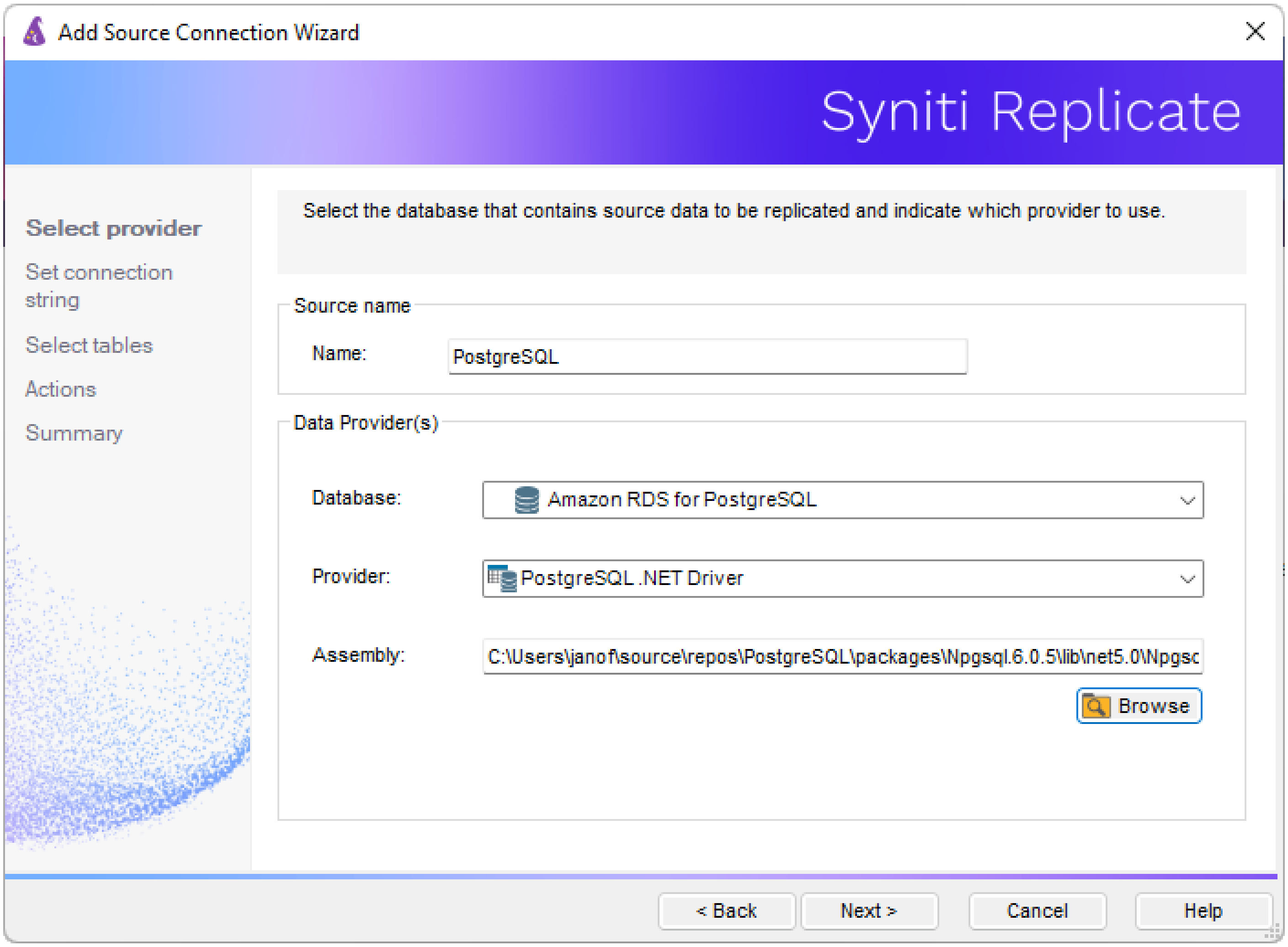
Select PostgreSQL from the drop-down list.

Provider

PostgreSQL .NET Driver

Assembly

Locate the file Npgsql.dll, typically in the installation folder for the PostgreSQL .NET Provider.



Select the database that contains source data to be replicated and indicate which provider to use.

Source name

Name: PostgreSQL

Data Provider(s)

Database: Amazon RDS for PostgreSQL

Provider: PostgreSQL .NET Driver

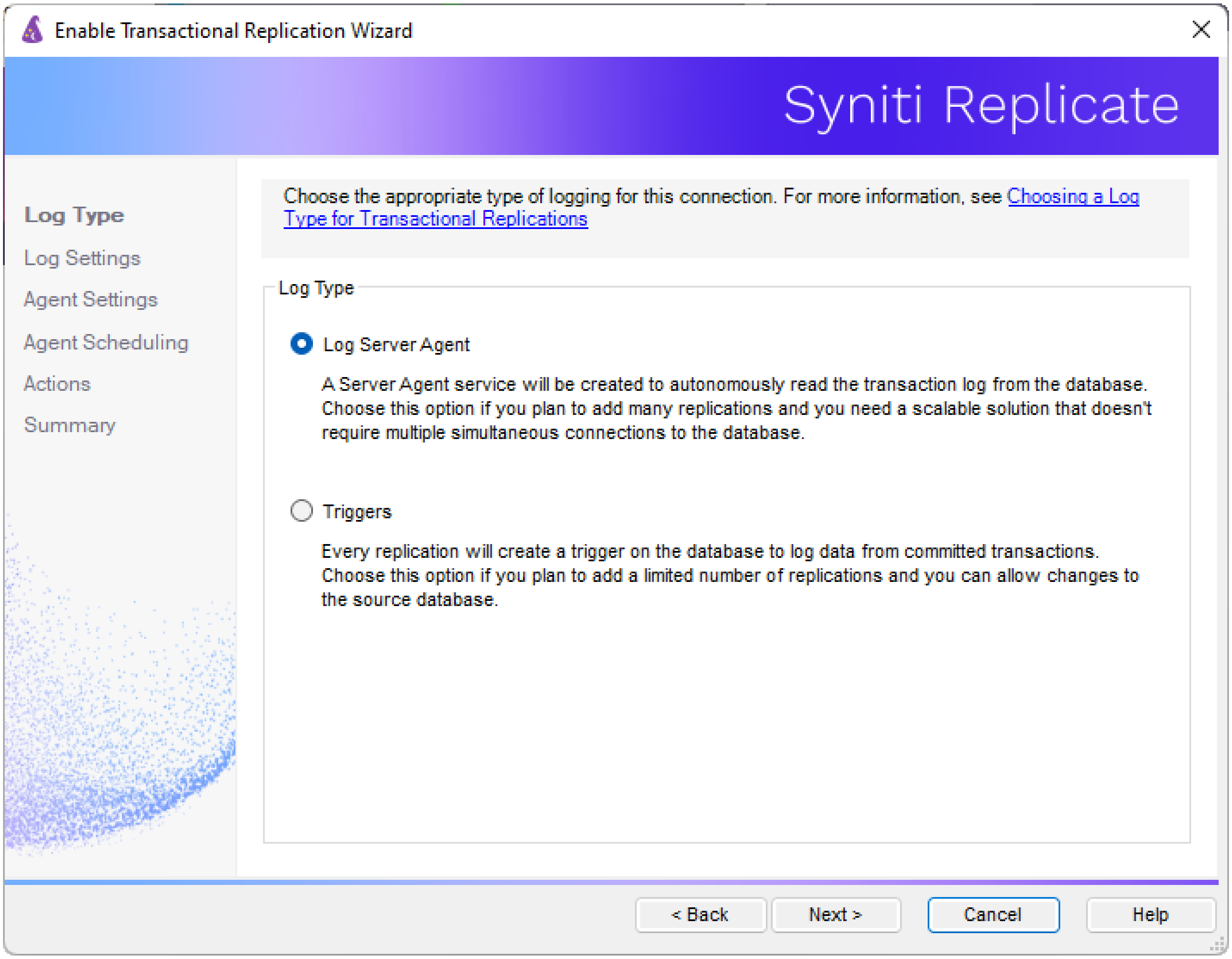
Assembly: C:\Users\janof\source\repos\PostgreSQL\packages\Npgsql.6.0.5\lib\net5.0\Npgsc

Enable Transactional Replication Wizard

For transactional replications (mirroring and synchronization), use the Enable Transactional Replication wizard after setting up a source connection. The following field(s) require specific information for PostgreSQL.

Log Type Screen

Select the Log Server Agent option.



Choose the appropriate type of logging for this connection. For more information, see Choosing a Log Type for Transactional Replications

Log Type

● Log Server Agent

A Server Agent service will be created to autonomously read the transaction log from the database. Choose this option if you plan to add many replications and you need a scalable solution that doesn't require multiple simultaneous connections to the database.

○ Triggers

Every replication will create a trigger on the database to log data from committed transactions. Choose this option if you plan to add a limited number of replications and you can allow changes to the source database.

Log Settings

Replication Slot: Use Existing Slot

Replication slots are channels that you open on the database to allow Syniti Replicate to receive data changes from the log. While the default is to use a new slot specifically for a Syniti Replicate connection, it is possible to reuse an existing slot if it is not consumed by any other connection. A replication slot has to be uniquely assigned to a single Syniti Replicate connection.

Replication Slot: Add New Slot

Syniti Replicate needs to define a "replication_slot" for every connection that it uses to replicate from PostgreSQL. This option allows you to set up a new slot from Syniti Replicate. However, the new slot will be added only if the maximum number of slots has not been exceeded. This value is set in the postgresql.conf file. Be aware that if slots are created then left unused, they still consume resources, so you should always manage replication slots carefully.

Plugin Type

Make sure that the option **test_decoding** is selected in the drop-down menu.