AWS Database Migration Services NoSQL Lab Runbook

MongoDB to DynamoDB Migration

Revised: 2017.10.25

Contents

List of Tables

List of Figures

1 Introduction

1.1 Objective

In this lab, you will be performing a database migration from a MongoDB source to a Amazon DynamoDB target using the AWS Databases Migration Service (AWS DMS).

1.1.1 Lab Setup

- Create EC2 Key Pair
- Launch AWS CloudFormation Stack
- Access Amazon AppStream 2.0 Tools
- OPTIONAL: download the JDBC drivers locally
- OPTIONAL: install database management tools locally

1.1.2 Lab Steps

- Create AWS Database Migration Instances
- Connect to your environment
- Setup AWS Schema Conversion Tool
- Convert the Oracle schema to PostgreSQL
- Create Source Endpoint in AWS DMS
- Create Target Endpoint in AWS DMS
- Create a Migration Task in AWS DMS
- Start the migration
- Generate transactions on Oracle and see the data being migrated to PostgreSQL - CDC

1.1.3 Lab Teardown

- Delete AWS CloudFormation Stack
- Delete EC2 Key Pair

1.2 About AWS Database Migration Service (AWS DMS)

The AWS Database Migration Service helps you migrate databases to AWS quickly and securely. The source database remains fully operational during the migration, minimizing downtime to applications that rely on the database. The AWS Database Migration Service can migrate your data to and from most widely used commercial and open-source databases.

The service supports homogenous migrations such as Oracle to Oracle, as well as heterogeneous migrations between different database platforms, such as Oracle to Amazon Aurora or Microsoft SQL Server to MySQL. It also allows you to stream data to Amazon Redshift, Amazon DynamoDB, and Amazon S3 from any of the supported sources including Amazon Aurora, PostgreSQL, MySQL, MariaDB, Oracle, SAP ASE, SQL Server and MongoDB, enabling consolidation and easy analysis of data in the petabyte-scale data warehouse. AWS Database Migration Service can also be used for continuous data replication with high-availability.

To find out more about AWS DMS, see the product page at https://aws.amazon.com/dms/

2 Lab Setup

2.1 Setup EC2 Key Pair

In this step, you will generate an EC2 key pair for use in the Database Migration Workshop labs.

Make sure you are have selected the **Asia Pacific (Tokyo)** region by visiting the following link:

> http://amzn.to/aws-tokyo-keypairs (=> https://ap-northeast-1.console.aws.amazon.com/ec2/v2/home?region=ap-northeast-1#KeyPairs:sort=keyName)

If no EC2 key pairs have been created in this region yet, you will see the following screen:

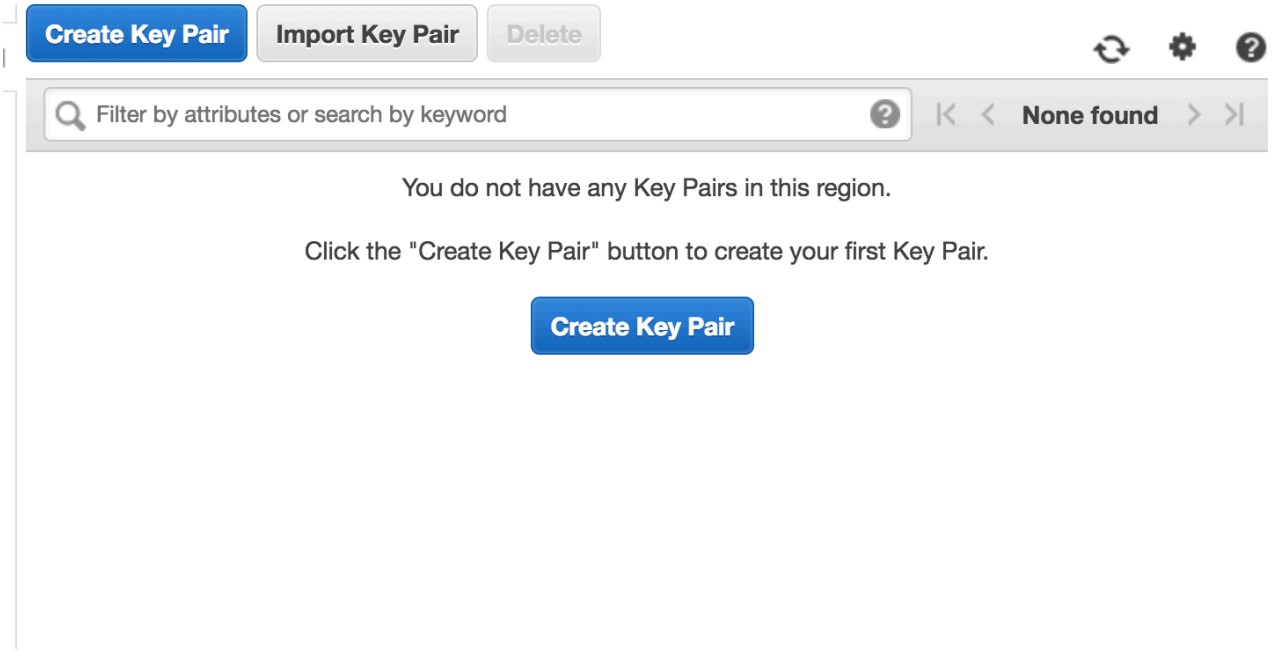

Figure 1: *Key Pairs: List All Keys*

> *For this workshop, we recommend the creation of a new EC2 key pair to be used associated with workshop resources. We will later delete this key pair along with the workshop resources.*

You should click the **Create Key Pair** button and enter **workshop** as the name for the new key pair as shown below, clicking the **Create** button to complete the creation of the new key pair.

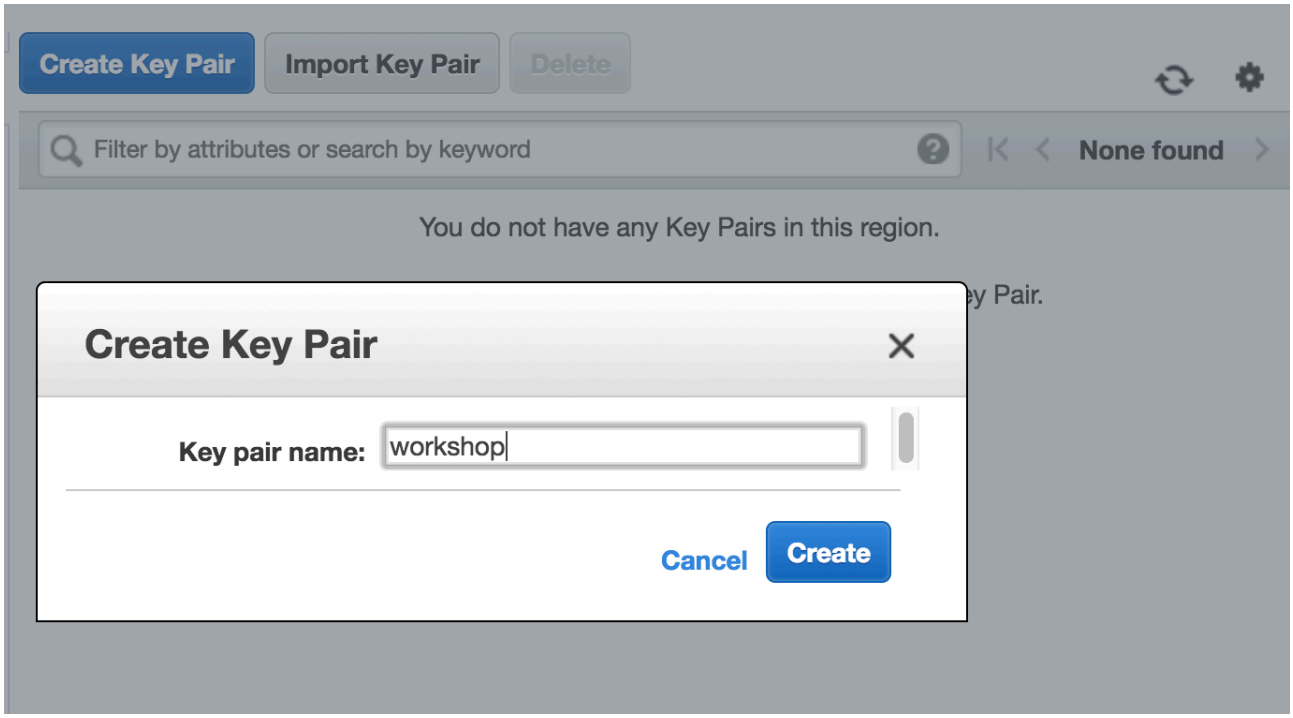

Figure 2: *Key Pair: Create Dialog*

You should now see a new EC2 key pair labeled **workshop**:

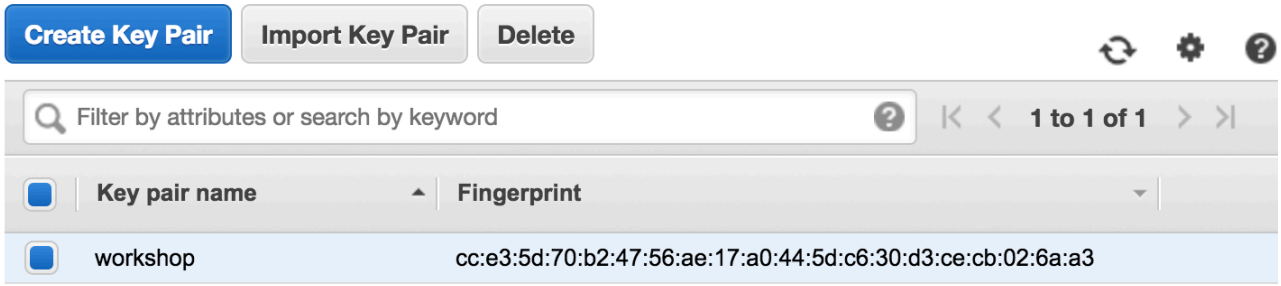

Figure 3: *Key Pair: Created*

The private key for this EC2 key pair will have automatically downloaded to your browser's default directory, and this file will be called **workshop.pem**.

2.2 Setup AWS CloudFormation Stack

In this step, you will launch a AWS CloudFormation template that will setup the following resources needed for this lab:

- Source Database: Amazon RDS Oracle (this database will be pre-populated with sample database installed from https://github.com/awslabs/aws-database-migration-samples)
- Target Database: Amazon RDS PostgreSQL

  CAUTION: The resources created automatically with this CloudFormation template will continue to run until the CloudFormation stack is deleted or the individual resources are shutdown -- the steps for teardown are located in this document at Teardown: AWS Cloudformation Stack

To launch this template, use the following link:

http://amzn.to/aws-dms-workshop-lab-1 (=> https://ap-northeast-1.console.aws.amazon.com/cloudformation/home?region=ap-northeast-1#/stacks/new?stackName=workshop&templateURL=https://s3-ap-northeast-1.amazonaws.com/aws-dms-workshop/workshop-lab-1.yaml)

2.2.1 AWS CloudFormation Stack Selection

You should now see the following:

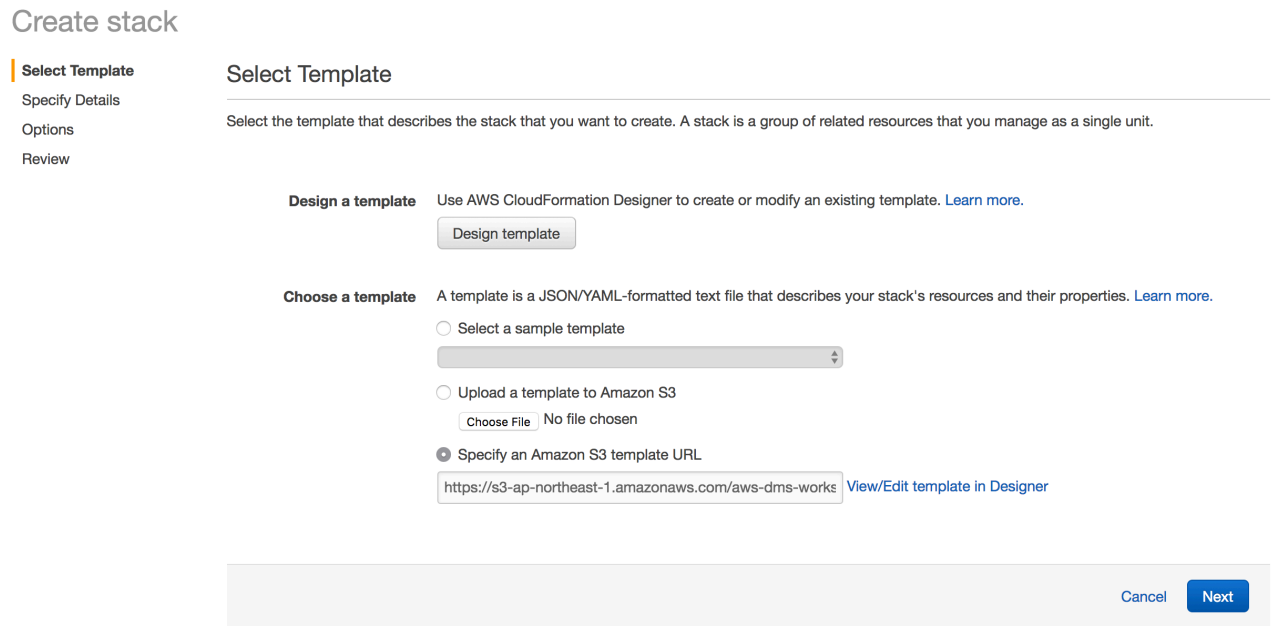

Figure 4: *AWS CloudFormation Stack Selection: Template*

The default settings are recommended, and no changes are required to this page. Click the **Next** button on the bottom of the page to continue.

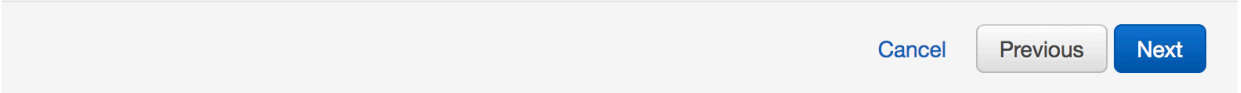

Figure 5: *AWS CloudFormation Stack Selection: Confirmation*

2.2.2 AWS CloudFormation Stack Settings

This page displays the settings and parameters for the CloudFormation stack.

- For **KeyPair**, you will need to confirm your Key Pair created earlier (in our example, it is labeled workshop)
- For **OracleDBPassword** and **PostgresDBPassword**, you will need to enter unique, random passwords.

  CAUTION: These database servers will be public facing with no restrictions on source IPv4 address to access them during the life of this CFN template, so please take care to use passwords of sufficient complexity.

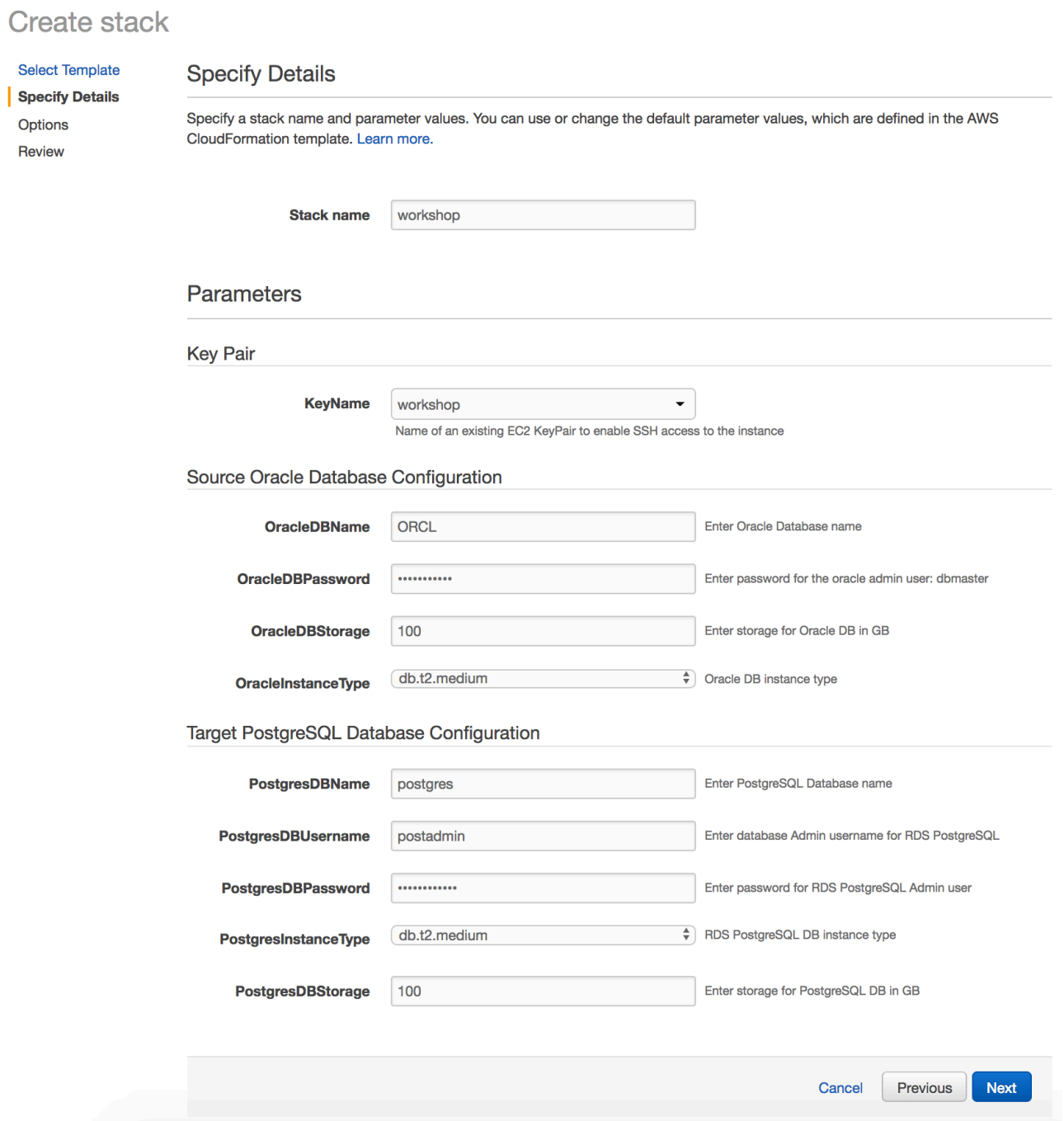

Figure 6: *AWS CloudFormation: Settings Overview*

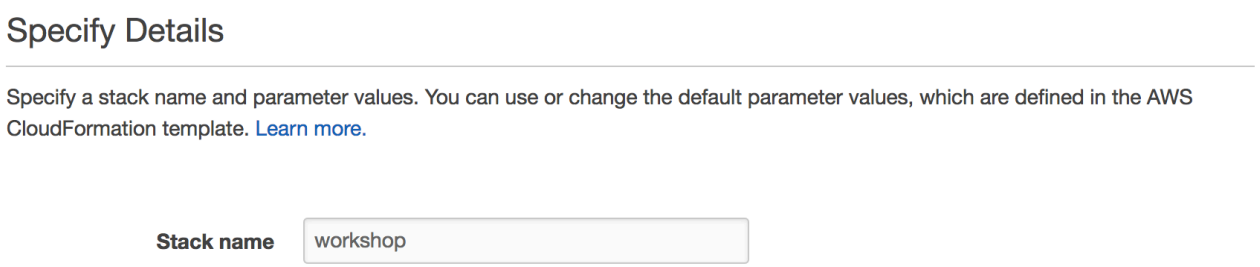

Figure 7: *AWS CloudFormation: Stack Name*

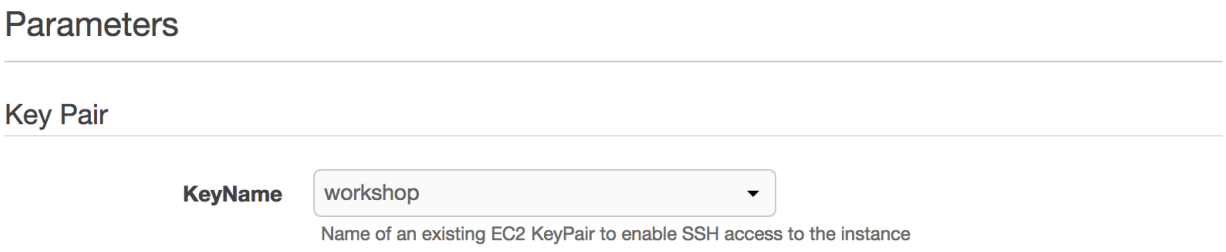

Figure 8: *AWS CloudFormation: Key Pair*

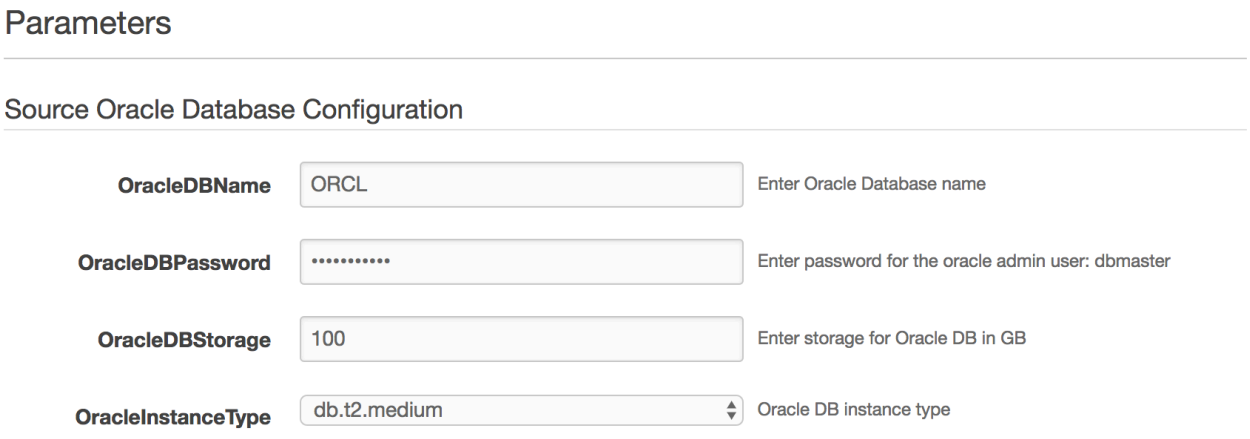

Figure 9: *AWS CloudFormation: Oracle*

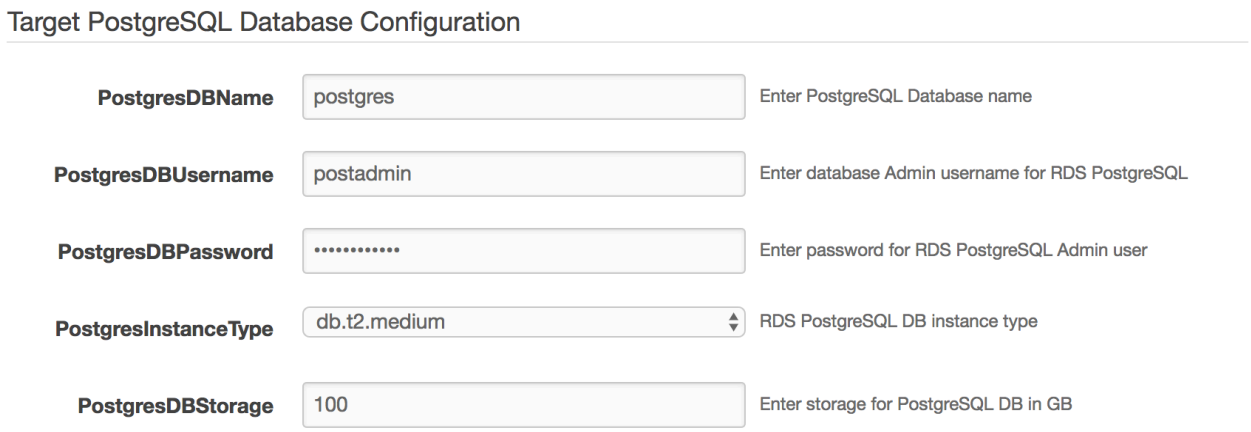

Figure 10: *AWS CloudFormation: Postgres*

Once you have confirmed the settings, click the **Next** button on the bottom of the page to continue.

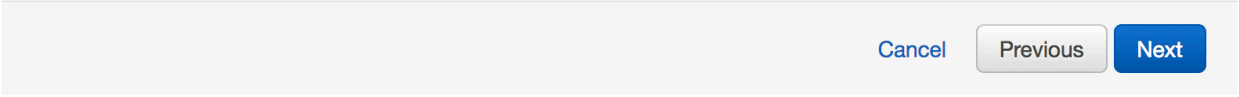

Figure 11: *AWS CloudFormation Stack Parameters: Confirmation*

2.2.3 AWS CloudFormation Stack Options

You will now see the Options for this CloudFormation template. **The default settings are recommended, and no changes are required to this page.**

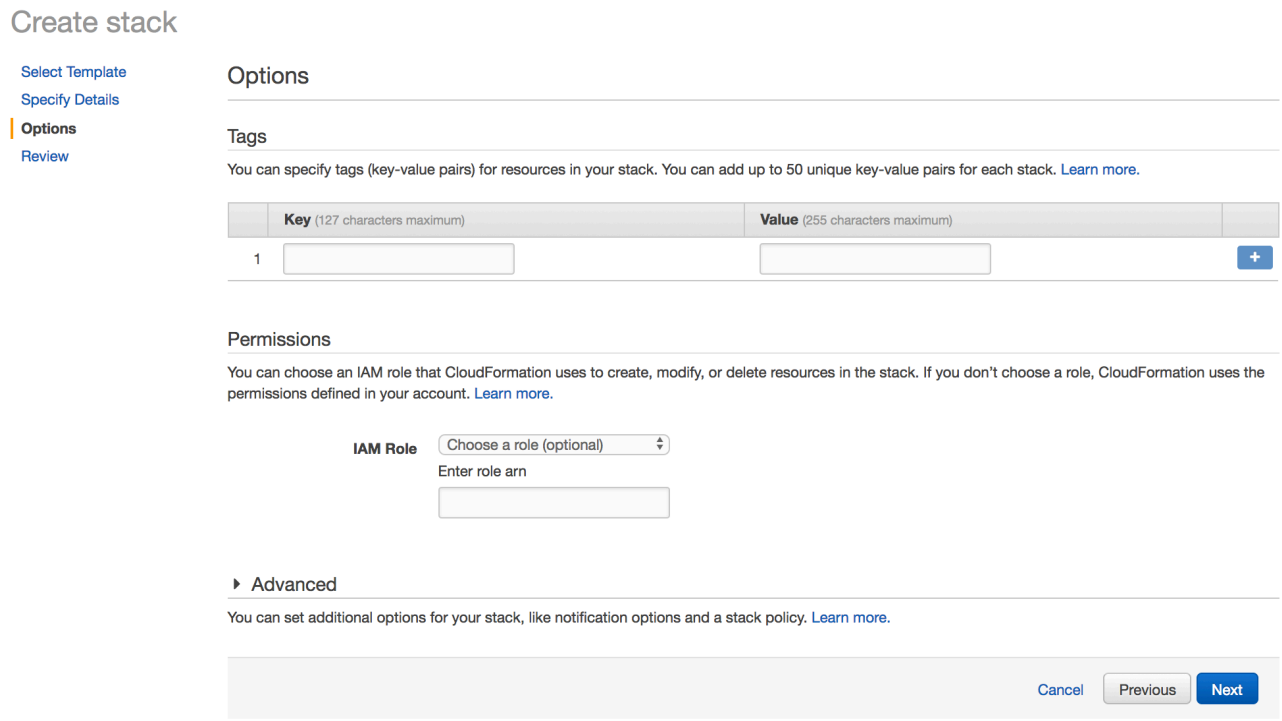

Figure 12: *AWS CloudFormation Stack Options: All*

Click the **Next** button on the bottom of the page to continue.

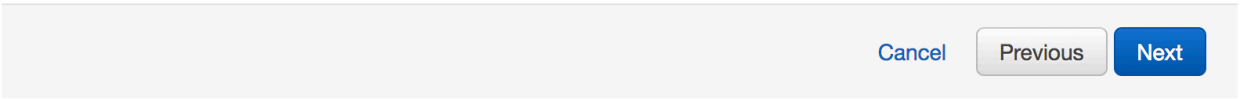

Figure 13: *AWS CloudFormation Stack Options: Confirmation*

2.2.4 AWS CloudFormation Stack Review

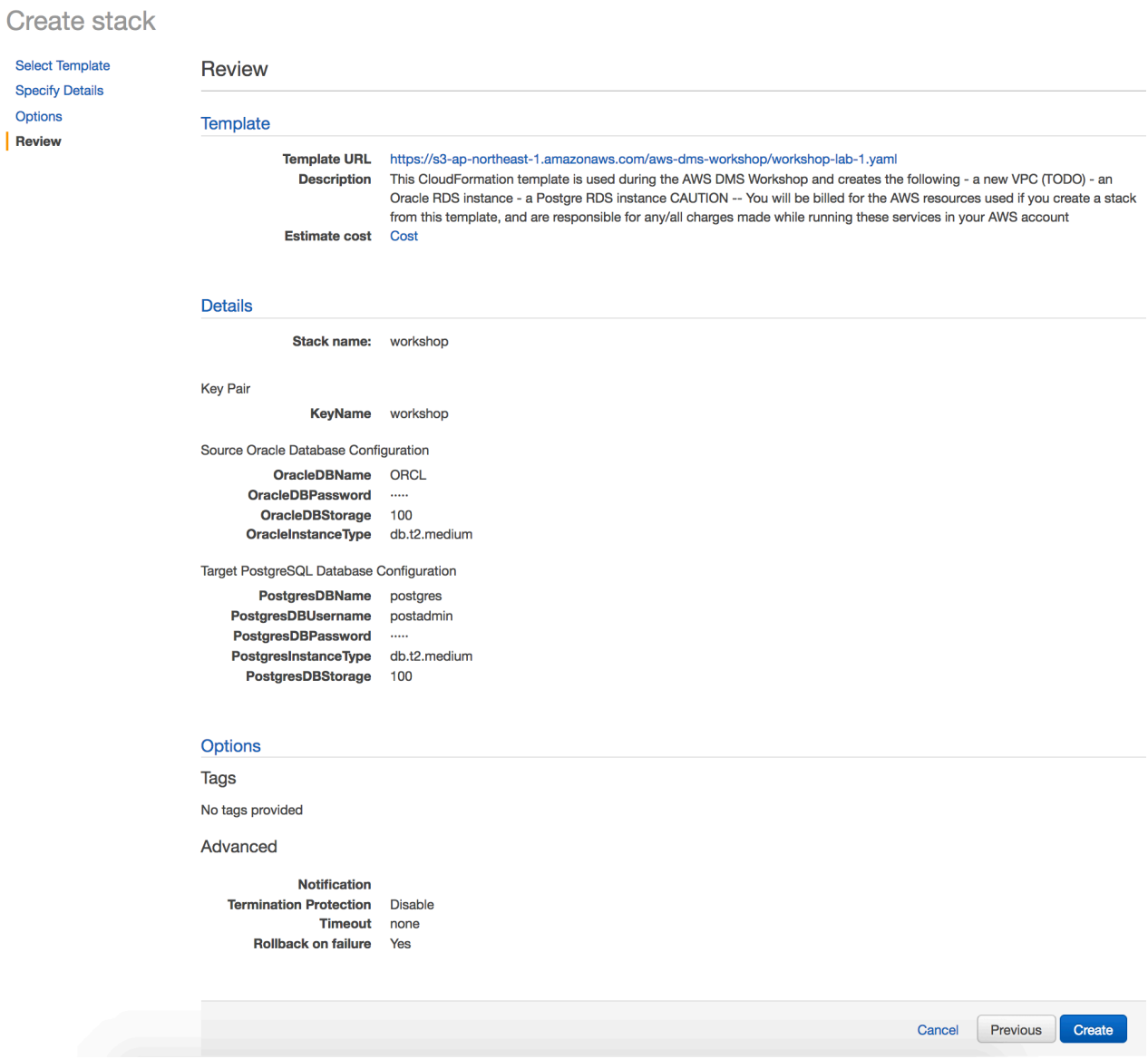

Figure 14: *AWS CloudFormation Stack: Review*

Click the **Create** button on the bottom of the page to continue.

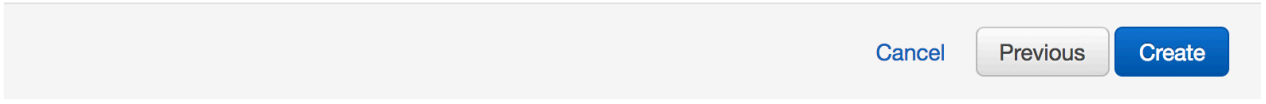

Figure 15: *AWS CloudFormation Stack Review: Creation*

AWS resources associated with this workshop lab will now be automatically created immediately, and billing will

proceed until this CloudFormation stack is deleted or those resources are individually stopped/terminated -- the steps for teardown are located in this document at Teardown: AWS Cloudformation Stack

2.2.5 AWS CloudFormation Stack: List Stacks

You should now see a list of any existing CloudFormation templates for this region in your account, and the new CloudFormation stack called **workshop** should now appear in your console.

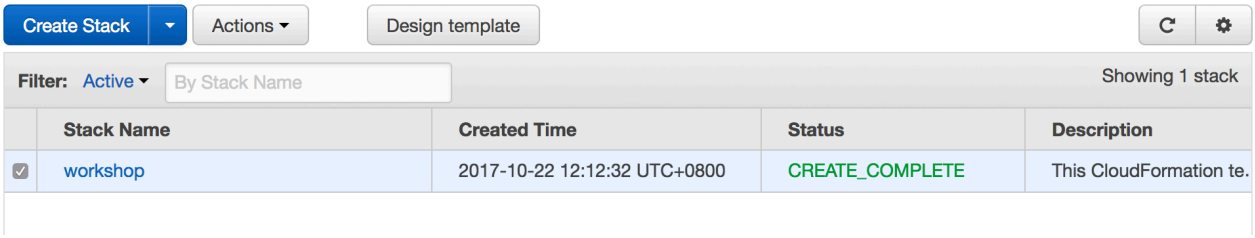

Figure 16: *AWS CloudFormation Stack: List Stacks*

If the stack does not immediately appear, you may need to click the **Refresh** button above the list panel.

2.2.6 AWS CloudFormation Stack: Outputs

When the stack and its underlying resource creations are completed, the status will be displayed as **CREATE_COMPLETE**. Once this has occurred, we can gather Outputs from the CloudFormation stack.

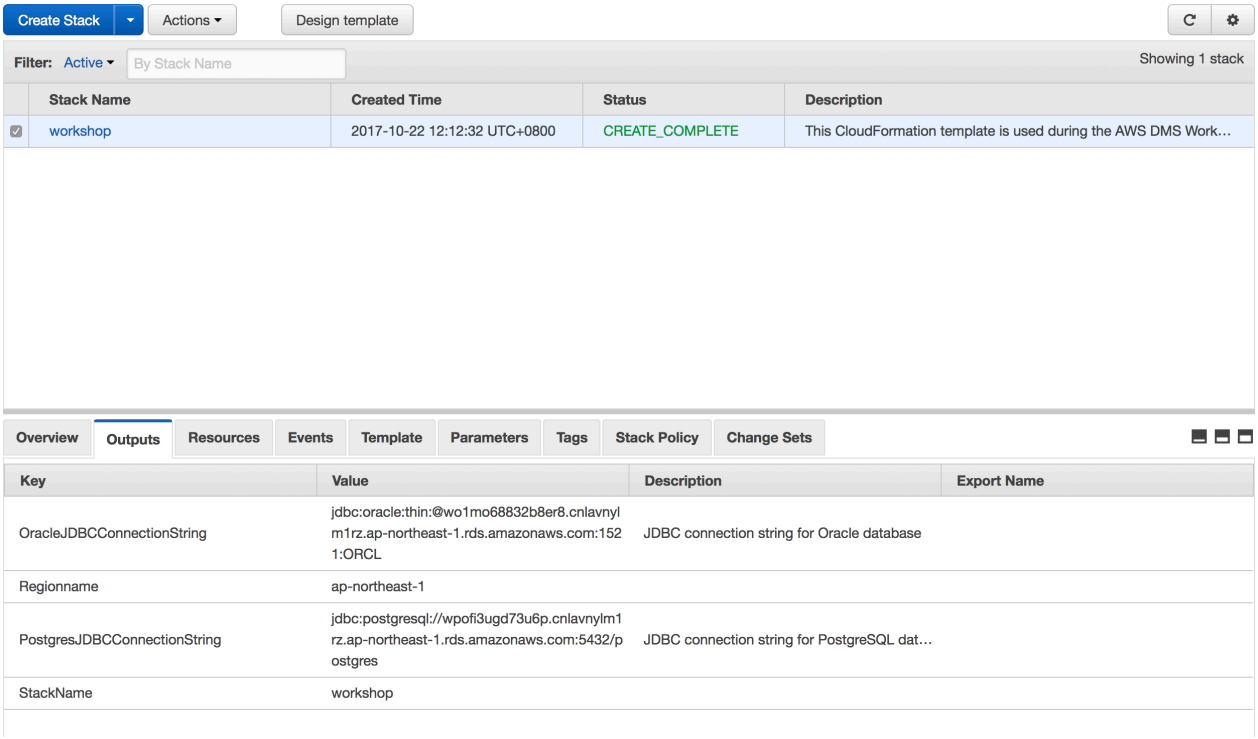

Figure 17: *AWS CloudFormation Stack: Outputs*

2.3 Setup Amazon AppStream Tools

To access the workshop lab tools directly, without any installation, go to the following link:

> http://amzn.to/aws-dms-workshop-client (=> https://appstream2.ap-northeast-1.aws.amazon.com/userpools#/signin?ref=Qxx2JrL9YU)

You will then see the following login screen:

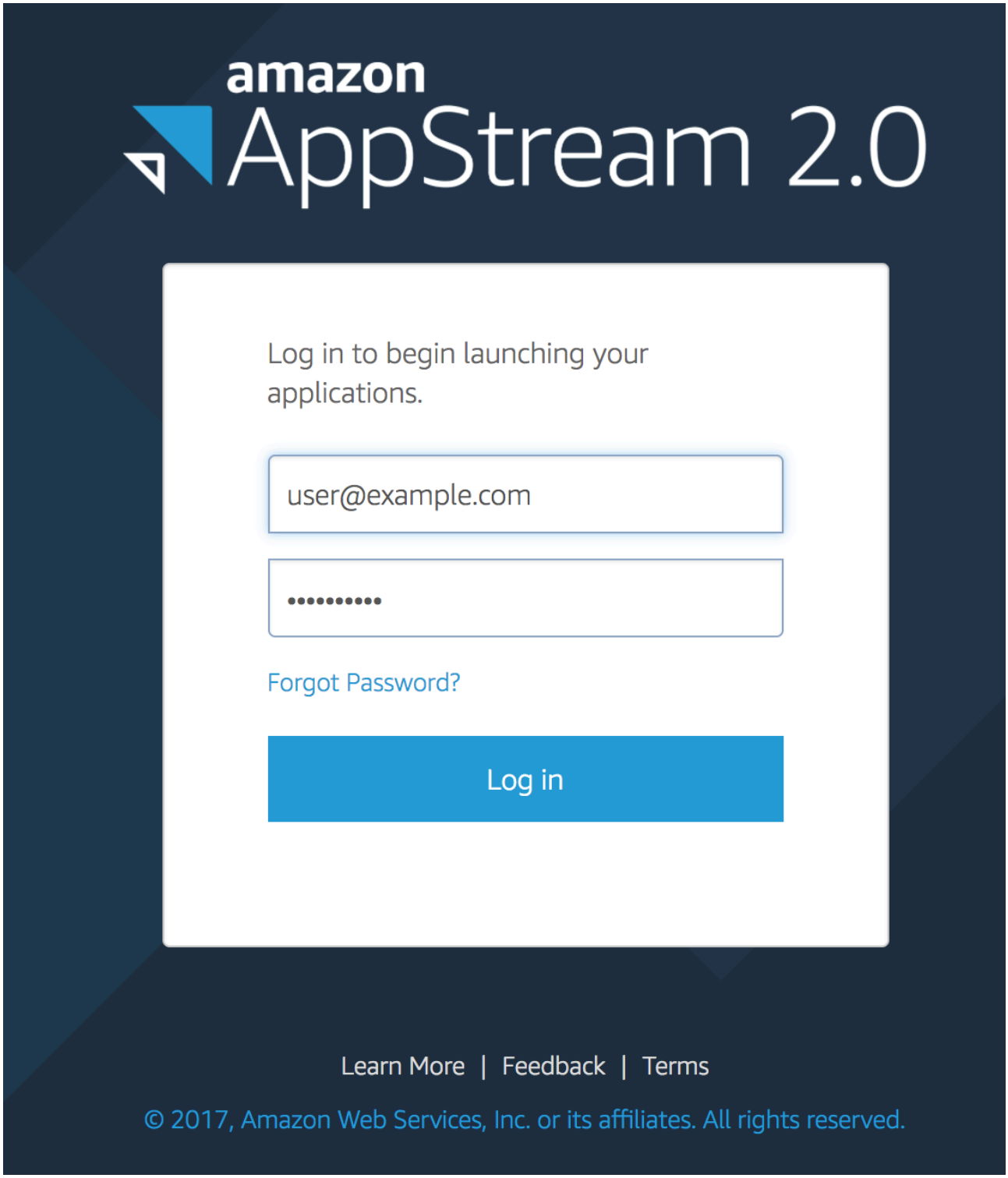

Figure 18: *Amazon AppStream 2.0 Login Screen*

If you have not already received an email with your credentials, please contact AWS staff on-site during this workshop to help provide those to you.

2.3.1 Amazon AppStream: Copy & Paste

When copying into your AppStream session, you will need to using the menu bar at the top of the AppStream screen, as show below:

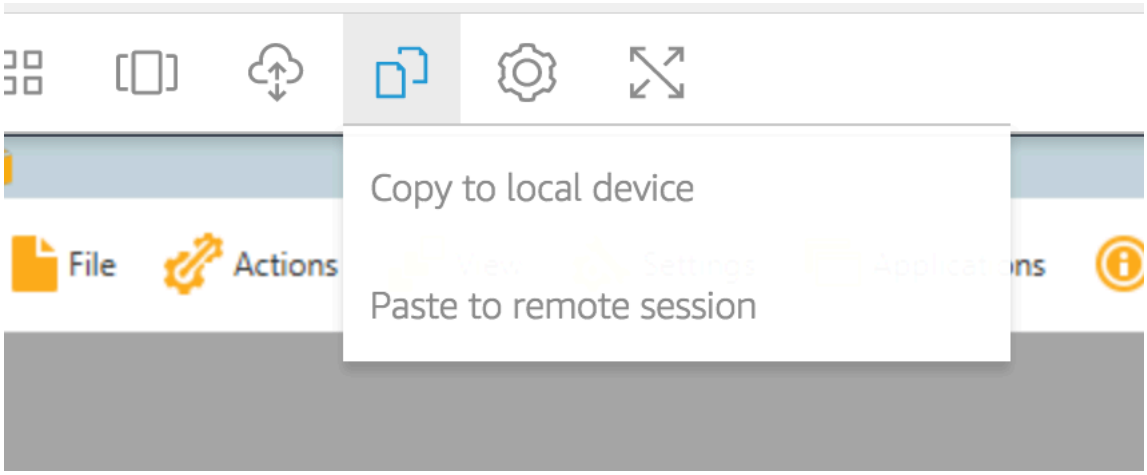

Figure 19: *Amazon AppStream 2.0 Copy-Paste Menu*

By selecting the **Paste to remote session** option, you will now be presented with a dialog (shown below is the Mac OS X version):

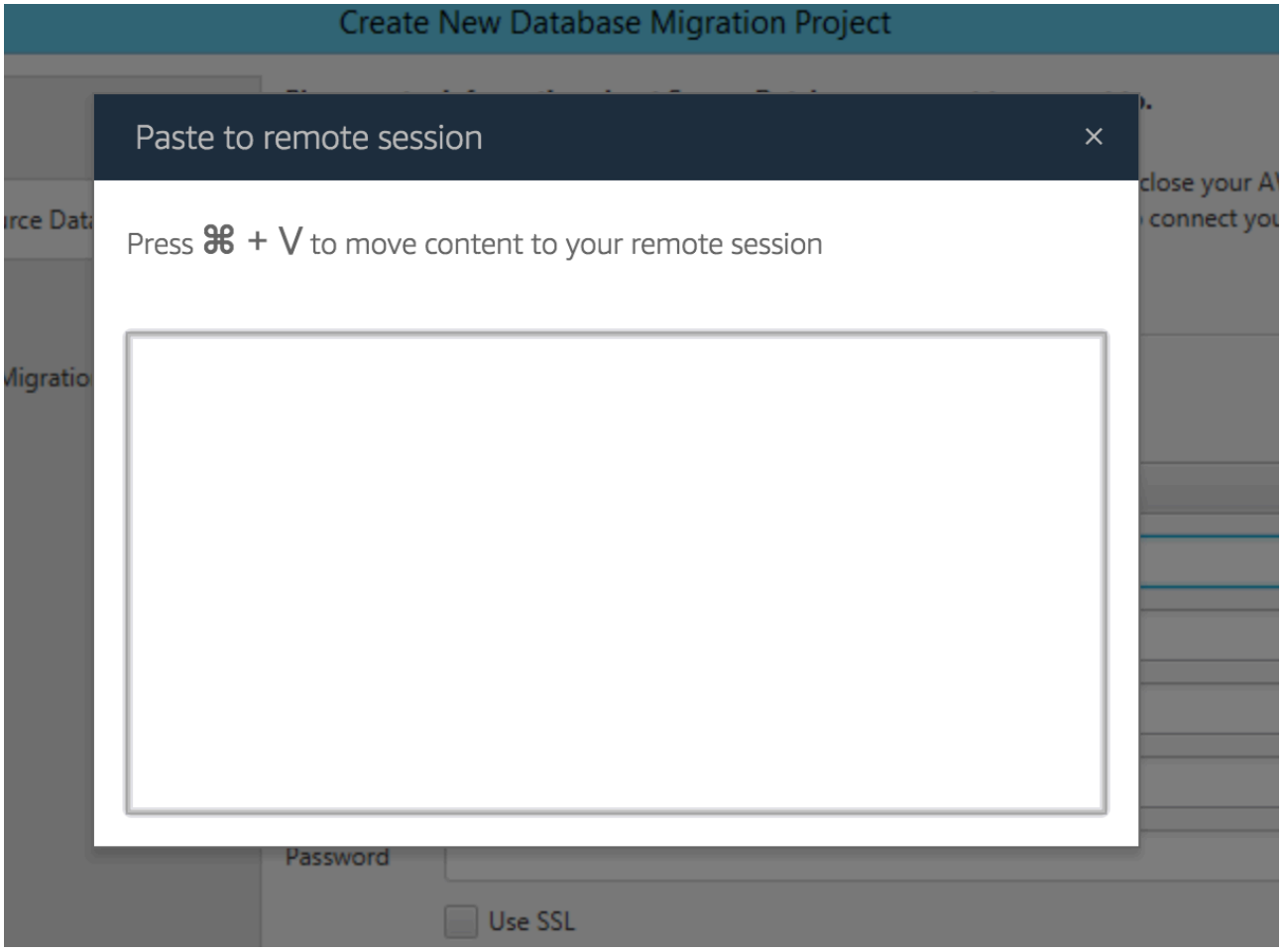

Figure 20: *Amazon AppStream 2.0 Copy-Paste Menu*

Following the instructions (using either {Command-V} in Mac, or {Control-V} on Windows), the dialog will automatically disappear and the buffer for pasting will now be transferred to the remote desktop, where it can be pasted using the standard Windows paste keys of {Control-V}.

2.4 Setup SQL database management tools (Optional)

In this step, we will install a database management tool of your choice locally.

> *For those participants not wishing to install a database management tool locally, you can use the DBeaver tool via Amazon AppStream 2.0 resources that will have been provisioned for you temporarily. See Setup: Accessing Amazon AppStream 2.0 Tools*

Some popular and free tools include:

- SQL WorkbenchJ: http://www.sql-workbench.net/downloads.html
- DBeaver: http://dbeaver.jkiss.org/
- SQuirrel: http://squirrel-sql.sourceforge.net/

In this lab, we will be using SQL WorkbenchJ screenshots to demonstrate the lab activities.

3 Lab Steps

4 Lab Teardown

4.1 Teardown AWS DMS Resources

You will now destroy the previously created AWS DMS resources. Because there is an interdependency between these resources, we will terminate the resources in the reverse order of the original creation.

The order for destruction will be:

- Tasks
- Endpoints
- Replication Instances

You can find all of these resources under the AWS console for AWS Database Migration Services at the following link:

> http://amzn.to/aws-tokyo-dms-instances (=> https://ap-northeast-1.console.aws.amazon.com/dms/home?region=ap-northeast-1#replication-instances:)

4.1.1 Teardown AWS DMS Resoures: Tasks

First, you will delete the existing AWS DMS Task associated with this workshop. You can find this at the following link:

> http://amzn.to/aws-tokyo-dms-tasks (=> https://ap-northeast-1.console.aws.amazon.com/dms/home?region=ap-northeast-1#tasks:)

You should see a lit of all DMS Tasks in this region. Locate the DMS Task created earlier during this workshop. The default name for the Task created during this workshop was **dms-workshop-task-oracle2postgres**.

Select the task and, if it is running, click the **Stop** button.

Wait a few moments until the Task until the status is updated to Stop, then click the **Delete** button.

The process of deleting a DMS Task may take a minute or two. Continue to refresh until the DMS Task is no longer visible, then proceed to the next step.

4.1.2 Teardown AWS DMS Resoures: Endpoints

Next, you can now delete the DMS Endpoints that were created earlier in this lab. You can find this at the following link:

> http://amzn.to/aws-tokyo-dms-endpoints (=> https://ap-northeast-1.console.aws.amazon.com/dms/home?region=ap-northeast-1#endpoints:)

You should now see a list of all DMS Endpoints in this region. There will be two Endpoints to delete, one for the Source and one for the Target. The default names for this workshop are:

- Source: **dms-workshop-oracle**
- Target: **dms-workshop-postgres**

If you used those defaults, your page should look like the following:

Teardown AWS DMS - List All Endpoints

Select the Source Endpoint as shown below, then click the **Delete** button.

Teardown AWS DMS - Select Source Endpoint

You will be prompted to confirm this deletion as shown below, if you are certain this is the correct Endpoint from the workshop, then click the **Delete** button.

Teardown AWS DMS - Delete Source Endpoint

Next, select the Target Endpoint as shown below -- also note that the status for the Source Endpoint should now display as **Deleting**.

Teardown AWS DMS - Select Target Endpoint

Once selected, repeat the process as above, clicking the **Delete** button and confirming that you wish to delete the Target Endpoint from this workshop. Finally, you will see the following page:

Teardown AWS DMS - Endpoints Deleted

The process of deleting DMS Endpoints may take a minute or two. Continue to refresh until the DMS Endpoints are no longer visible, then proceed to the next step.

4.1.3 Teardown AWS DMS Resoures: Replication Instances

To delete the DMS replication instances for this workshop, we will first view the console for replication instances by visiting the following link:

> http://amzn.to/aws-tokyo-dms-instances (=> https://ap-northeast-1.console.aws.amazon.com/dms/home?region=ap-northeast-1#replication-instances:)

You should see a lit of all DMS Replication Instances in this region.

Teardown AWS DMS - Replication Instance List

Locate the DMS Replication Instance created earlier during this workshop. The default name for the Replication Instance created during this workshop was **dms-workshop-oracle2postgres-repl**.

You will now select your workshop DMS Replication Instance, clicking the **Delete** button to proceed:

Teardown AWS DMS - Replication Instance Selected

You will receive the following confirmation:

Teardown AWS DMS - Replication Instance Confirm Deletion

Click the **Delete** button again if you certain this is the correct DMS Replication Instance you set up earlier in the workshop.

The status of the Replication Instance will now show as **Deleted**: *Teardown AWS DMS - Replication Instance Deleted*

The process of deleting DMS Replication Instances may take a minute or two. Continue to refresh until the DMS Replication Instances are no longer visible, then proceed to the next step.

4.2 Teardown AWS CloudFormation Stack

For process of tearing down any resources created by a CloudFormation stack is a part of the CloudFormation lifecycle and can be performed.

> **CAUTION**: This step must be performed after the teardown of any DMS resources -- see Teardown AWS DMS Resources for this process.

4.2.1 Teardown CloudFormation Stack: Identify Workshop Stack

You can see a list of all active CloudFormation Stacks in this region by clicking the following link:

http://amzn.to/aws-tokyo-cloudformation-stacks-active (=> https://ap-northeast-1.console.aws.amazon.com/cloudformation/home?region=ap-northeast-1#/stacks?filter=active)

If you have chosen the default CloudFormation stack name during the setup, then you should now select the check-box on that specific CloudFormation stack and click the button **Delete Stack**

4.2.2 Teardown CloudFormation Stack: Delete Workshop Stack

4.2.3 Teardown CloudFormation Stack: Confirm Deletion

> *If your stack is still displayed with a **Delete in Progress** status, then please wait a few minutes for the CloudFormation stack to complete deletion.*

If the CloudFormation stack has been successfully deleted, and no other stacks are active in this region, you should expect to see the following:

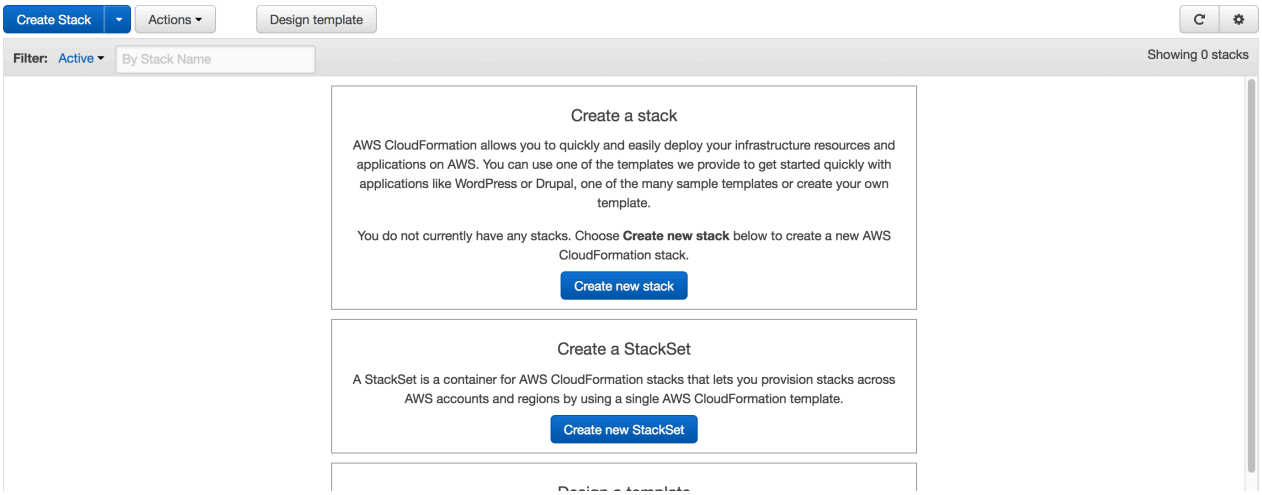

Figure 21: *Teardown CloudFormation Stack: Delete Success*

If the CloudFormation stack still exists, check the following remediations below based on the specific CloudFormation Stack Error:

- Status: Delete Failed

4.2.4 Teardown CloudFormation Stack Status: Delete Failed

If you should see the following message:

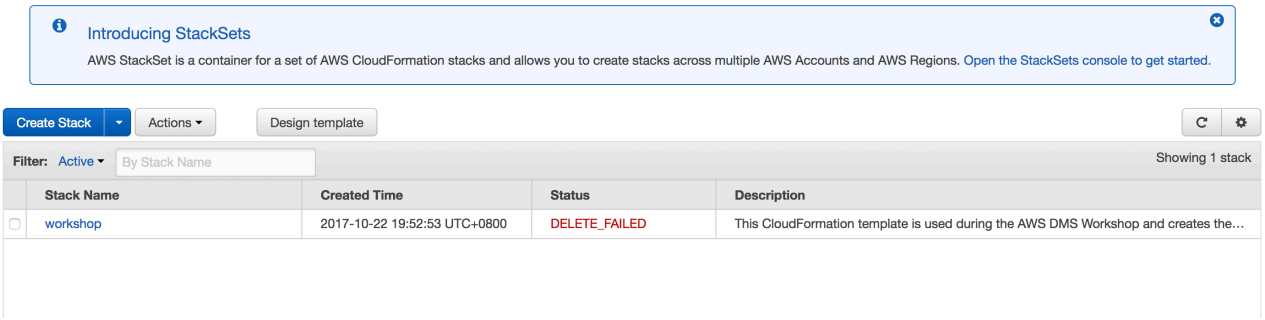

Figure 22: *Teardown CloudFormation Stack: Delete Failed*

First, confirm that the AWS DMS resources have been terminated -- see Teardown AWS DMS Resources for more details.

Second, you can retry the process to Delete the Workshop Stack above. You may be presented with a dialog similar to the following:

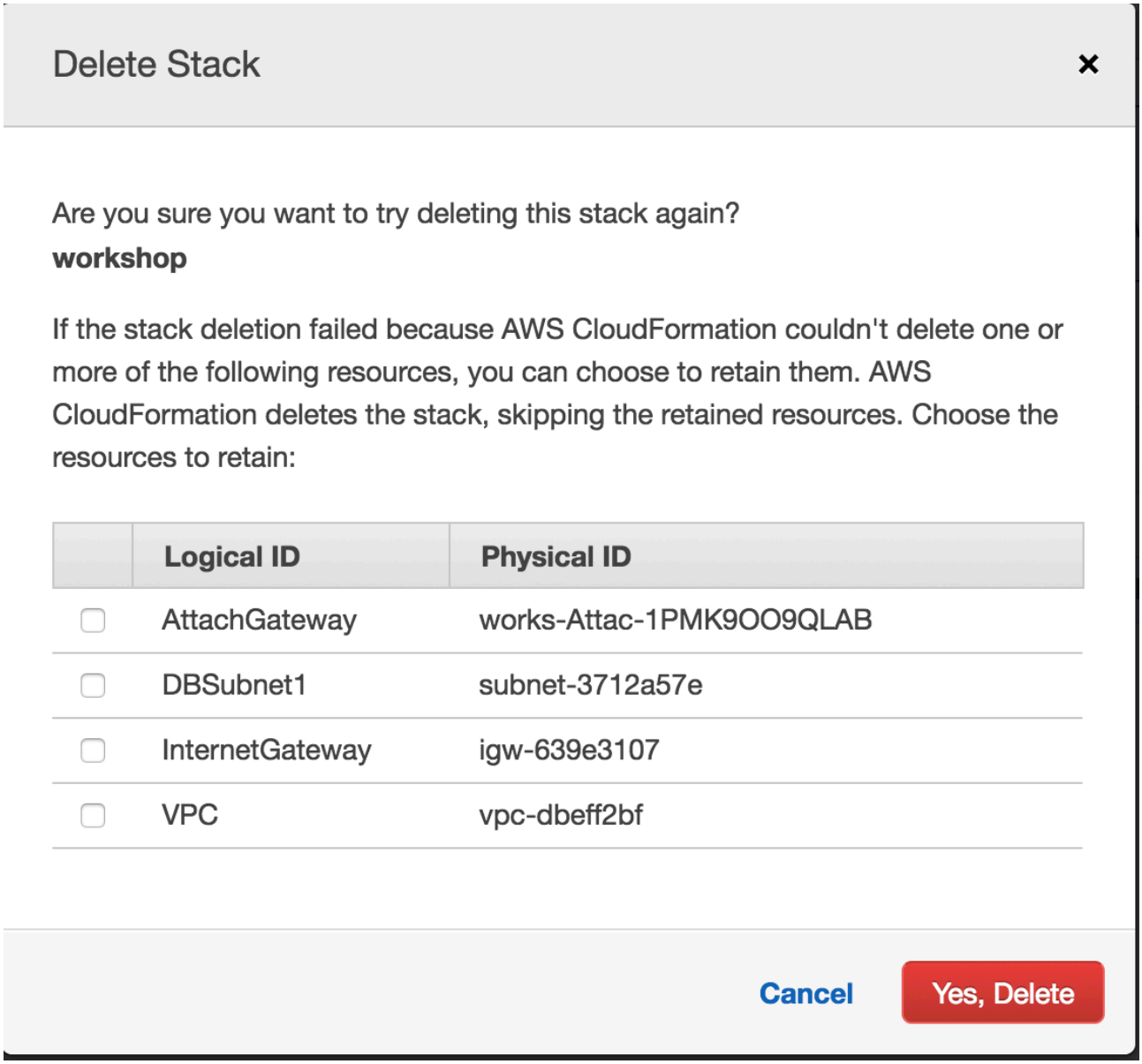

Figure 23: *Teardown CloudFormation Stack: Confirm Delete Resources*

If so, then individually confirm that the resources are no longer required, checking the box of each resource you wish to delete, then clicking the **Yes, Delete** button to complete the process.

4.3 Teardown EC2 Key Pair

If you had previously created an EC2 key pair for this workshop during setup, it is recommended that you now delete it to ensure security.

Follow this link to access your list of EC2 key pairs in this region:

http://amzn.to/aws-tokyo-keypairs (=> https://ap-northeast-1.console.aws.amazon.com/ec2/v2/home?region=ap-northeast-1#KeyPairs:sort=keyName)

You will see a list of key pairs similar to the following:

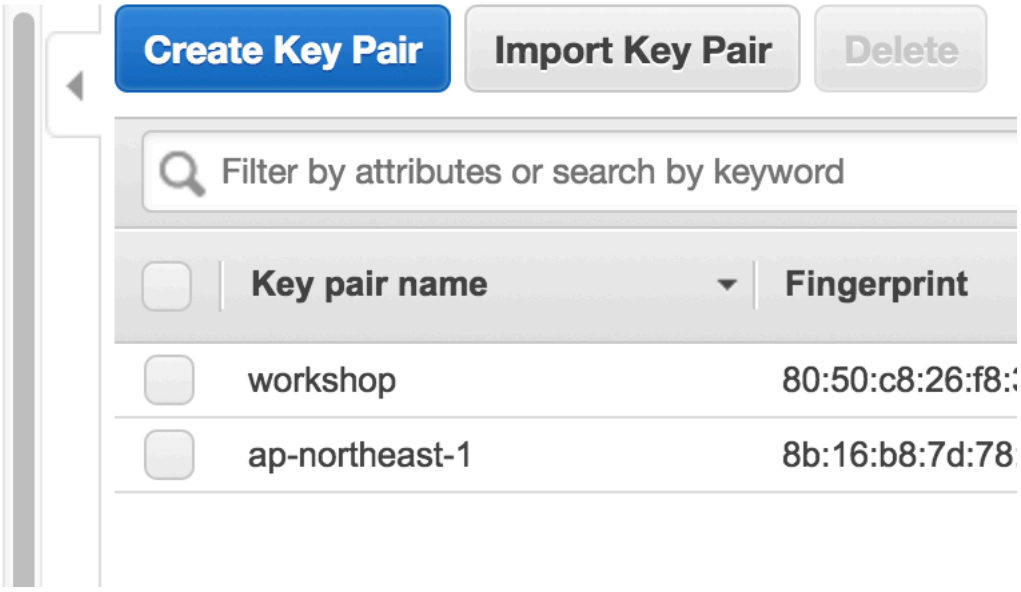

Figure 24: *Teardown EC2 Key Pair - List Keys*

Next, select the appropriate key pair (the default name for this workshop key pair was **workshop**), and click the **Delete** button, after which you will receive the following confirmation:

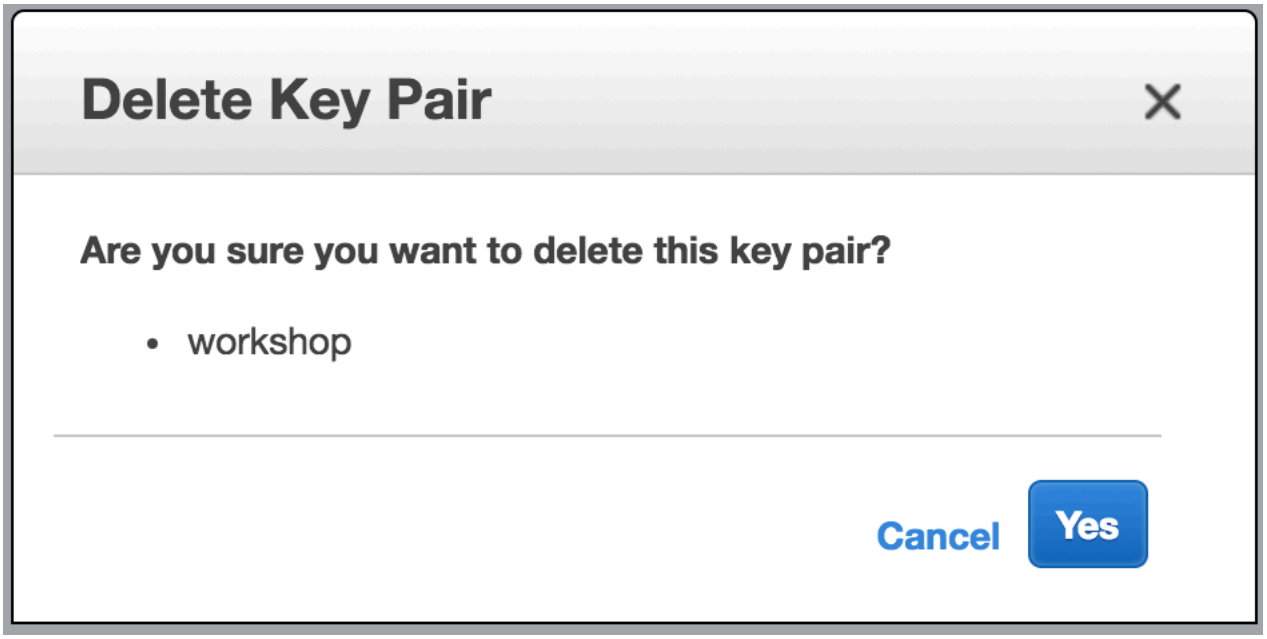

Figure 25: *Teardown EC2 Key Pair - Delete Key*

If you are certain this is the workshop key you created, then click **Yes** button to permanently delete this key.

> **CAUTION**: the EC2 Key Pair will be permanently deleted and cannot be recovered, so any associated resources will no longer be administratively accessible.

5 Conclusion

This concludes the workshop. We hope that you enjoyed it and learned from the experience. Please let us know what you enjoyed about the experience, and how we can improve this workshop, by filling out the survey.

Thank you for attending!