

Homework 02

Zhicheng Zhang (ZZC)

The screenshot shows the AWS Educate dashboard. At the top, there's a navigation bar with links for 'My Classrooms', 'Portfolio', 'Career Pathways', 'Badges', 'Jobs', 'AWS Account', and 'Logout'. Below the navigation bar, there's a user profile section with a graduation cap icon, the name 'Zhicheng Zhang', and statistics: 'Consecutive Days: 1', 'Pathways Completed: 0', and 'Badges Earned: 0'. A 'Preferred Language' dropdown is set to 'English'. The main content area is titled 'My Classrooms' in large orange text. It contains a sub-instruction: 'View your list of Classroom invitations and accept or decline the invitation. Access a Classroom by clicking Go to my classroom.' Below this, there's a table listing classroom invitations. The columns are: Course Name, Description, Educator, Course End Date, Credit Allocated Per Student, and Status. One row is visible, showing:

Course Name	Description	Educator	Course End Date	Credit Allocated Per Student	Status
Spring 2020 Database Systems and Database Applications	Relational Database Theory. Data Modeling for OLTP, OLAP, and NO SQL databases. Indexing. AWS implementation of multi-AZ OLTP and OLAP application with replicated back-end databases.	Rolando Fernandez	08/31/2020	\$200	Accepted

A blue button labeled 'Go to classroom' with a plus sign is located next to the accepted row. At the bottom of the table, there's a small note: 'A classroom invite has been sent to you.'

Login to AWS Educate (<https://www.awseducate.com/signin/SiteLogin>) and go to My Classrooms. Select Database Systems 1.

Vocareum

Home ▾ My Classes Help zxc_actual@gwu.edu

Welcome to your AWS Educate Account

AWS Educate provides you with access to a wide variety of AWS Services for you to get your hands on and build on AWS! To get started, click on the AWS Console button to log in to your AWS console.

Please read the FAQ below to help you get started on your Starter Account.

- What are the list of services supported?
- What regions are supported with Starter Accounts or Classroom Accounts?
- I can't start any resources. What happened?
- Can I create users within my Starter or Classroom Account for others to access?
- Can I create my own IAM policy within Starter Account or Classroom?
- Can I use marketplace software with my Starter Account or Classrooms?
- Are there any restrictions on AWS services in my AWS Educate Account?
- Are FPGA Instances Supported?
- How do I share image with my students?

Your AWS Account Status

	Active full access (zxc_actual@gwu.edu)
	\$200 remaining credits (estimated)
	2:60 session time

[Account Details](#) [AWS Console](#)

Please use AWS Educate Account responsibly. Remember to shut down your instances when not in use to make the best use of your credits. And, don't forget to logout once you are done with your work!

Click on AWS Console.

AWS Management Console

AWS services

Find Services
You can enter names, keywords or acronyms.

▼ Recently visited services

 VPC  AWS Organizations  S3
 IAM  Billing

▶ All services

Build a solution
Get started with simple wizards and automated workflows.

Launch a virtual machine With EC2 2-3 minutes 	Build a web app With Elastic Beanstalk 6 minutes 	Build using virtual servers With Lightsail 1-2 minutes 
Register a domain With Route 53 3 minutes 	Connect an IoT device With AWS IoT 5 minutes 	Start migrating to AWS With CloudEndure Migration 1-2 minutes 

▶ See more

On the AWS Console, click on “Services” and in the Group search enter “rds” for Relational Database Services.

The screenshot shows the AWS RDS (Relational Database Service) dashboard. On the left, there's a sidebar with various navigation links like Dashboard, Databases, Query Editor, etc. A modal window titled "Amazon Aurora" is open, providing information about the service and a "Create database" button. Below the modal, there's a link to "Or, Restore Aurora DB cluster from S3".

The main content area has three sections: "Resources", "Recommended for you", and "Create database".

- Resources:** Shows usage statistics for the US East (N. Virginia) region.
 - DB Instances (0/40)
 - Allocated storage (0 TB/100 TB)
 - Click here to increase DB Instances limit
 - DB Clusters (0/40)
 - Reserved instances (0/40)
 - Snapshots (0)
 - Manual (0/100)
 - Automated (0)
 - Recent events (0)
 - Event subscriptions (0/20)
 - Parameter groups (0)
 - Default (0)
 - Custom (0/100)
 - Option groups (0)
 - Default (0)
 - Custom (0/20)
 - Subnet groups (0/50)
 - Supported platforms VPC
 - Default network vpc-d64370ac
- Recommended for you:** Lists three recommended features:
 - Automatic Failover with RDS Multi-AZ**: Describes enabling Multi-AZ configurations for production workloads.
 - Enhanced Performance with Read Replicas**: Describes scaling out beyond capacity constraints using multiple DB instances.
 - Fast Cross-Region Disaster Recovery**: Describes deploying databases across multiple regions for low lag and cross-region scaling.
- Create database:** A section for creating new databases, featuring a "Restore from S3" button and a prominent "Create database" button.

At the bottom, there are links for Feedback, English (US), and legal notices: © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use.

Click on 'Create Database'.

Screenshot of the AWS RDS 'Create database' interface.

The top navigation bar includes: Services, Resource Groups, N. Virginia, and Support.

A blue banner at the top says: "We listened to your feedback! Now, create a database with a single click using our pre-built configurations! Or choose your own configurations." It also has a "Share your feedback" button and an "X" icon.

The main title is "Create database".

The first section is "Choose a database creation method":

- Standard Create: You set all of the configuration options, including ones for availability, security, backups, and maintenance.
- Easy Create: Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

The next section is "Engine options":

- Amazon Aurora: Represented by a stack of three cylinders with sparkles.
- MySQL: Represented by the MySQL logo (a stylized orange and white circular design).
- MariaDB: Represented by a cartoon seal.
- PostgreSQL: Represented by the PostgreSQL logo (a blue and white stylized letter 'P').
- Oracle: Represented by the Oracle logo (the word "ORACLE" in red capital letters).
- Microsoft SQL Server: Represented by the Microsoft SQL Server logo (a red and white stylized letter 'S' with the words "Microsoft SQL Server").

The "Edition" section shows:

- Amazon Aurora with MySQL compatibility
- Amazon Aurora with PostgreSQL compatibility

The "Templates" section says: "Choose a sample template to meet your use case."

Footer links include: Feedback, English (US), © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved., Privacy Policy, and Terms of Use.

Select Oracle and Oracle Enterprise Edition.

Choose Dev/Test and click on Next.

For “DB engine version” click on the drop down and select the latest patch level for Oracle 12.2.0.1.

aws Services Resource Groups N. Virginia Support

Engine options

Engine type [Info](#)

- Amazon Aurora 
- MySQL 
- MariaDB 
- PostgreSQL 
- Oracle 
ORACLE
- Microsoft SQL Server 

Edition

- Oracle Enterprise Edition
Efficient, reliable, and secure database management system that delivers comprehensive high-end capabilities for mission-critical applications and demanding database workloads.
- Oracle Standard Edition
Affordable and full-featured database management system supporting up to 32 vCPUs.
- Oracle Standard Edition One
Affordable and full-featured database management system supporting up to 16 vCPUs.
- Oracle Standard Edition Two
Affordable and full-featured database management system supporting up to 16 vCPUs. Oracle Database Standard Edition Two is a replacement for Standard Edition and Standard Edition One.

Version [Info](#)

Oracle 12.2.0.1.ru-2019-01.rur-2019-01.r1

License

bring-your-own-license

Templates

Choose a sample template to meet your use case.

- Production
Use defaults for high availability and fast, consistent performance.
- Dev/Test
This instance is intended for development use outside of a production environment.

Feedback English (US) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

Enter a DB instance name. Example: First letter of first name + First 3 letters of last name + any number

Enter a username and password of your choice.

The screenshot shows the 'Settings' tab of the AWS RDS 'Create DB Instance' wizard. The 'DB instance identifier' is set to 'zzh1'. The 'Master username' is 'zzh1_admin'. The 'Master password' and 'Confirm password' fields both contain masked text. Under 'DB instance size', the 'Burstable classes (includes t classes)' option is selected, and the 'db.t3.small' class is chosen, which includes 2 vCPUs, 2 GiB RAM, and EBS: 1500 Mbps. The 'Storage' section is partially visible at the bottom.

DB instance identifier [Info](#)
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens (1 to 15 for SQL Server). First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

Credentials Settings

Master username [Info](#)
Type a login ID for the master user of your DB instance.

1 to 16 alphanumeric characters. First character must be a letter
 Auto generate a password
Amazon RDS can generate a password for you, or you can specify your own password

Master password [Info](#)

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), "(double quote) and @ (at sign).

Confirm password [Info](#)

DB instance size

DB instance class [Info](#)
Choose a DB instance class that meets your processing power and memory requirements. The DB instance class options below are limited to those supported by the engine you selected above.

Standard classes (includes m classes)
 Memory Optimized classes (includes r and x classes)
 Burstable classes (includes t classes)

▼
2 vCPUs 2 GiB RAM EBS: 1500 Mbps

Include previous generation classes

Storage

[Feedback](#) [English \(US\)](#) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)

Enable Public accessibility and select availability zone.

Select 'Create new VPC security group'.

Enter the database name same as your DB instance identifier to make it easier to remember.

The screenshot shows the 'Connectivity' configuration page for an Amazon RDS database. At the top, the 'Default VPC (vpc-d64370ac)' is selected. A note states: 'After a database is created, you can't change the VPC selection.' Below this, the 'Additional connectivity configuration' section is expanded, showing the 'Subnet group' set to 'default-vpc-d64370ac'. Under 'Publicly accessible', the 'Yes' option is selected, with a note explaining that EC2 instances outside the VPC can connect. The 'VPC security group' section shows 'Create new' selected, with a note about security group rules. A new security group name 'zzha1' is entered. The 'Availability zone' is set to 'us-east-1a', and the 'Database port' is set to '1521'.

Feedback English (US) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

Enter the database name same as your DB instance identifier (step 8) to make it easier to remember.

The screenshot shows the 'Additional configuration' section of the AWS RDS 'Create DB Instance' wizard. It includes fields for Database options (Initial database name: zzha1), DB parameter group (default.oracle-ee-12.2), Option group (default:oracle-ee-12-2), Character set (AL32UTF8), Backup (Enable automatic backups checked, Backup retention period: 7 days, Backup window: No preference), Encryption (Enable Encryption checked), and Master key (Info). The top navigation bar shows the AWS logo, Services, Resource Groups, a bell icon, user info (vocstartsoft/user585637=zzc...), N. Virginia, and Support.

Additional configuration
Database options, encryption enabled, backup enabled, backtrack disabled, Performance Insights enabled, Enhanced Monitoring enabled, maintenance, CloudWatch Logs, delete protection disabled

Database options

Initial database name [Info](#)
zzha1
If you do not specify a database name, Amazon RDS does not create a database.

DB parameter group [Info](#)
default.oracle-ee-12.2

Option group [Info](#)
default:oracle-ee-12-2

Character set
AL32UTF8

Backup
Creates a point in time snapshot of your database

Enable automatic backups
Enabling backups will automatically create backups of your database during a certain time window.

Backup retention period [Info](#)
Choose the number of days that RDS should retain automatic backups for this instance.
7 days

Backup window [Info](#)
Select the period you want automated backups of the database to be created by Amazon RDS.

Select window
 No preference

Copy tags to snapshots

Encryption

Enable Encryption
Choose to encrypt the given instance. Master key ids and aliases appear in the list after they have been created using the Key Management Service(KMS) console. [Info](#)

Master key [Info](#)

[Feedback](#) [English \(US\)](#) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)

Select 'Enable enhanced monitoring' and select all checkboxes under 'Log exports'.

The screenshot shows the 'Monitoring' section of the AWS RDS Modify DB Instance configuration page. It includes the following settings:

- Enable Enhanced monitoring**: Checked.
- Enabling Enhanced monitoring metrics**: Described as useful for seeing how different processes or threads use the CPU.
- Granularity**: Set to "60 seconds".
- Monitoring Role**: Set to "default".
- Clicking "Create database"**: Will authorize RDS to create the IAM role rds-monitoring-role.
- Log exports**: Options include Alert log, Audit log, Listener log, and Trace log, all of which are checked.
- IAM role**: A note states: "The following service-linked role is used for publishing logs to CloudWatch Logs."
- RDS Service Linked Role**: A callout box contains the instruction: "Ensure that General, Slow Query, and Audit Logs are turned on. Error logs are enabled by default." with a "Learn more" link.
- Maintenance**: Includes "Auto minor version upgrade" (Info) and "Enable auto minor version upgrade" (unchecked).
- Maintenance window**: Info: "Select the period you want pending modifications or maintenance applied to the database by Amazon RDS." Options: "Select window" (radio button unselected) and "No preference" (radio button selected).
- Deletion protection**: Includes "Enable deletion protection" (unchecked).

At the bottom of the page, there are links for Feedback, English (US), Copyright notice (© 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.), Privacy Policy, and Terms of Use.

Click on 'Create Database'.

The screenshot shows the AWS RDS Databases page. At the top, there is a blue banner indicating that a database named "zzha1" is "Creating". Below the banner, the page title is "RDS > Databases". The main area is titled "Databases" and contains a table with one row. The table has columns for "DB Identifier", "Role", "Engine", and "Region & /". The row shows "zzha1" as the DB Identifier, "Instance" as the Role, "Oracle Enterprise Edition" as the Engine, and "us-east-1a" as the Region. There are buttons for "Group resources", "Modify", "Actions", "Restore from S3", and a prominent orange "Create database" button. A search bar labeled "Filter databases" is also present. The bottom of the page includes standard AWS footer links: Feedback, English (US), Copyright notice (2008-2020), Privacy Policy, and Terms of Use.

DB Identifier	Role	Engine	Region & /
zzha1	Instance	Oracle Enterprise Edition	us-east-1a

Feedback English (US) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

Wait until displays 'Available'. This may take several minutes.

The screenshot shows the AWS RDS console for the database 'zzha1'. The top navigation bar includes 'Services', 'Resource Groups', 'N. Virginia', and 'Support'. The left sidebar shows 'RDS > Databases > zzha1'. The main content area has a summary table and tabs for 'Connectivity & security', 'Monitoring', 'Logs & events', 'Configuration', and 'Maintenance & backups'. The 'Connectivity & security' tab is selected, displaying endpoint and port details, networking information, and security group rules. The 'Security group rules' section shows two entries. The bottom of the page includes links for 'Feedback', 'English (US)', 'Privacy Policy', and 'Terms of Use'.

DB Identifier	CPU	Info	Class
zzha1	6.00%	Available	db.t3.small
Role	Current activity	Engine	Region & AZ
Instance		Oracle Enterprise Edition	us-east-1a

Connectivity & security

Endpoint & port	Networking	Security
Endpoint zzha1.cw1jseybyxbu.us-east-1.rds.amazonaws.com	Availability zone us-east-1a	VPC security groups zzha1 (sg-09db6baa70b8b515c) (active)
Port 1521	VPC vpc-d64370ac	Public accessibility Yes
	Subnet group default-vpc-d64370ac	Certificate authority rds-ca-2019
	Subnets subnet-847b99a5 subnet-ba88a384 subnet-050fef5a subnet-041fc60a subnet-e09b7c86 subnet-da4bf97	Certificate authority date Aug 22nd, 2024

Security group rules (2)

Feedback English (US) © 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

Scroll down to the security section and click on the security group name.

The screenshot shows the AWS Management Console interface for managing security groups. At the top, there's a navigation bar with the AWS logo, 'Services' dropdown, 'Resource Groups' dropdown, a star icon, a bell icon, the user name 'vocstartsoft/user585637=zzc...', a location dropdown for 'N. Virginia', and a 'Support' dropdown. Below the navigation is a search bar with the placeholder 'search : zzha1' and a 'Create Security Group' button. To the right of the search bar are icons for refresh, settings, and help. A message '1 to 1 of 1' indicates one result found. The main content area displays a table with the following data:

Name	Group ID	Group Name	VPC ID	Owner
sg-09db6baa70b8b515c	zzha1	vpc-d64370ac	921760170598	

Below this, a detailed view of the selected security group 'sg-09db6baa70b8b515c' is shown. The title 'Security Group: sg-09db6baa70b8b515c' is at the top. There are tabs for 'Description', 'Inbound', 'Outbound', and 'Tags', with 'Description' being the active tab. Under 'Description', the details are:

Group name	zzha1	Group description	Created by RDS management console
Group ID	sg-09db6baa70b8b515c	VPC ID	vpc-d64370ac

At the bottom of the page, there are links for 'Feedback', 'English (US)', a copyright notice ('© 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.'), and 'Privacy Policy' and 'Terms of Use'.

Click on Inbound and then click Edit. Make sure that your parameters match the screenshot below.

The screenshot shows two views of the AWS Security Groups interface. The top view is a list of security groups, and the bottom view is a detailed configuration page for a specific security group's inbound rules.

List of Security Groups:

Name	Group ID	Group Name	VPC ID	Owner
sg-09db6baa70b8b515c	zzha1	vpc-d64370ac	921760170598	

Edit inbound rules (Security Group: sg-09db6baa70b8b515c):

Type	Protocol	Port Range	Source	Description
Oracle-RDS	TCP	1521	Custom 0.0.0.0/0	e.g. SSH for Admin
Custom TCP I	TCP	1521	Custom ::/0	e.g. SSH for Admin

Inbound Rules (Security Group: sg-09db6baa70b8b515c):

Type	Protocol	Port Range	Source	Description
Oracle-RDS	TCP	1521	173.66.210.249/32	

Click on Save.

The screenshot shows the AWS Management Console interface for managing security groups. At the top, there's a navigation bar with the AWS logo, 'Services' dropdown, 'Resource Groups' dropdown, a star icon, a bell icon, the user name 'vocstartsoft/user585637=zzc...', 'N. Virginia' region dropdown, and 'Support' dropdown. Below the navigation bar is a search bar with the placeholder 'search : zzha1' and an 'Add filter' button. To the right of the search bar are navigation icons: a magnifying glass, back/forward arrows, and a question mark. The main content area displays a table of security groups. The columns are 'Name', 'Group ID', 'Group Name', 'VPC ID', and 'Owner'. A single row is visible, showing 'sg-09db6baa70b8b515c' as the Group ID, 'zzha1' as the Group Name, 'vpc-d64370ac' as the VPC ID, and '921760170598' as the Owner. Below this table is a large, empty white space. At the bottom of the page, there's a section for the selected security group 'sg-09db6baa70b8b515c'. This section includes tabs for 'Description', 'Inbound' (which is selected), 'Outbound', and 'Tags'. Under the 'Inbound' tab, there's an 'Edit' button. Below the 'Edit' button is a table with columns 'Type', 'Protocol', 'Port Range', 'Source', and 'Description'. Two entries are listed: one for Oracle-RDS with TCP protocol, port range 1521, source 0.0.0.0/0, and description 'Oracle-RDS'; and another for Oracle-RDS with TCP protocol, port range 1521, source ::/0, and description 'Oracle-RDS'. At the very bottom of the page, there are links for 'Feedback', 'English (US)', copyright notice '© 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 'Privacy Policy', and 'Terms of Use'.

Click on Outbound and then click Edit. Make sure that your parameters match the screenshot below.

The screenshot shows the AWS Management Console interface for managing security groups. At the top, there's a navigation bar with 'Services', 'Resource Groups', and other account information. Below it is a search bar and a table listing a single security group named 'zzha1'. The table columns include Name, Group ID, Group Name, VPC ID, and Owner.

Below the table, a modal window titled 'Edit outbound rules' is open. It has tabs for Type, Protocol, Port Range, Destination, and Description. Under Type, 'All traffic' is selected. Under Protocol, 'All' is selected. Under Port Range, '0 - 65535' is selected. Under Destination, 'Custom' is selected with '0.0.0.0/0' entered. A note at the bottom of this modal states: 'NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic on that rule to be dropped for a very brief period of time until the new rule can be created.'

At the bottom of the main page, there's another modal window for editing an outbound rule. This window has tabs for Description, Inbound, Outbound, and Tags. The 'Outbound' tab is selected, and the 'Edit' button is highlighted with a blue border. The table below shows a single rule: Type 'All traffic', Protocol 'All', Port Range 'All', and Destination '0.0.0.0/0'.

Click on Save.

The screenshot shows the AWS Management Console interface for managing security groups. At the top, there's a navigation bar with the AWS logo, 'Services' dropdown, 'Resource Groups' dropdown, a star icon, a bell icon, the user name 'vocstartsoft/user585637=zzc...', 'N. Virginia' region, and 'Support' dropdown. Below the navigation is a search bar with the placeholder 'search : zzha1' and a 'Create Security Group' button. The main area displays a table of security groups:

Name	Group ID	Group Name	VPC ID	Owner
sg-09db6baa70b8b515c	zzha1	vpc-d64370ac	921760170598	

Below the table, a modal window is open for the security group 'sg-09db6baa70b8b515c'. The modal has tabs for 'Description', 'Inbound' (which is selected), 'Outbound', and 'Tags'. Under the 'Outbound' tab, there's an 'Edit' button and a table with columns: Type, Protocol, Port Range, Destination, and Description. The first row shows 'All traffic' for Type, 'All' for Protocol, 'All' for Port Range, '0.0.0.0/0' for Destination, and an empty Description field.

At the bottom of the modal, there are three small square icons for sharing or copying the security group URL. The footer of the page includes links for 'Feedback', 'English (US)', copyright notice (© 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All rights reserved.), 'Privacy Policy', and 'Terms of Use'.

Go to RDS -> Databases. Click on the database you created.

Save the Endpoint value under 'Connectivity' in notepad. We will use this later.

The screenshot shows the AWS RDS 'Databases' section with 'zzha1' selected. The 'Summary' tab is active, displaying basic information about the database instance:

DB identifier	zzha1	CPU	Info	Class
Role	Instance	1.00%	Available	db.t3.small
		Current activity	Engine	Region & AZ
			Oracle Enterprise Edition	us-east-1a

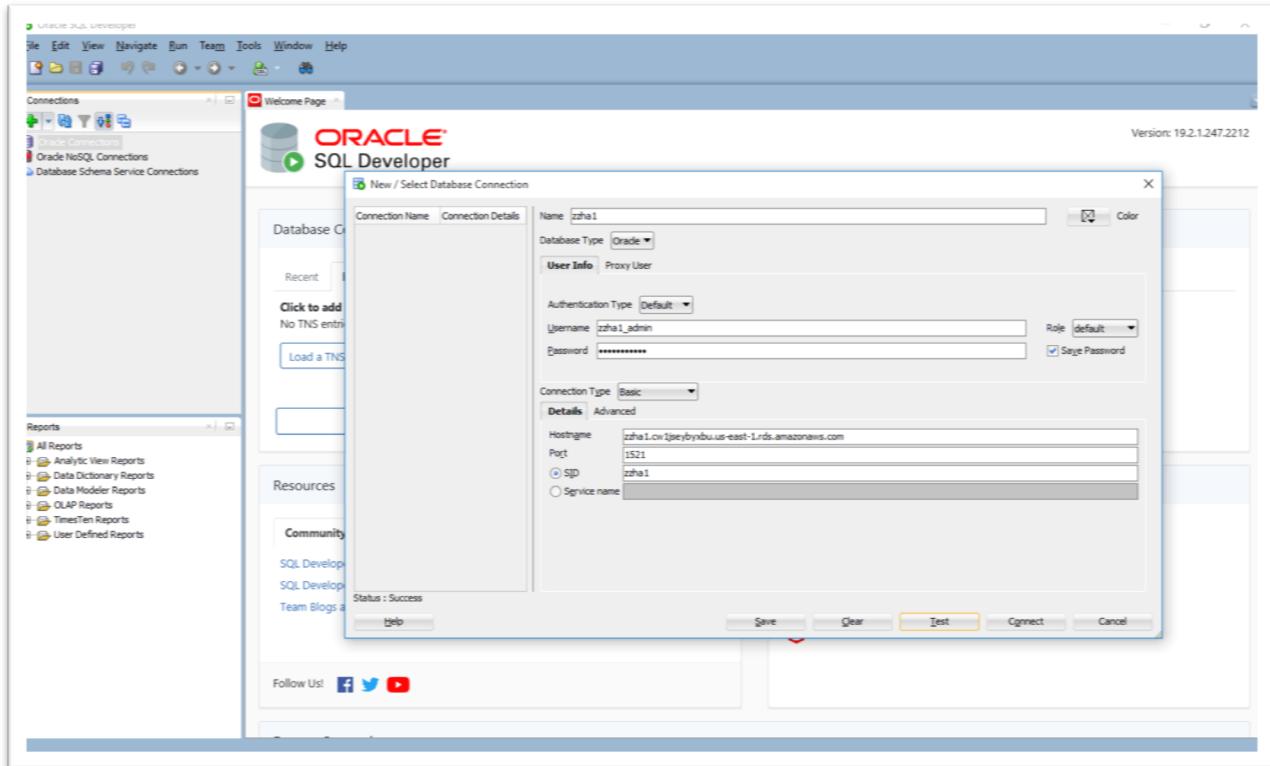
Below the summary, there are tabs for 'Connectivity & security', 'Monitoring', 'Logs & events', 'Configuration', and 'Maintenance & backups'. The 'Connectivity & security' tab is selected, showing detailed network configuration:

Endpoint & port	Networking	Security
Endpoint zzha1.cw1jseybyxbu.us-east-1.rds.amazonaws.com	Availability zone us-east-1a VPC vpc-d64370ac	VPC security groups zzha1 (sg-09db6baa70b8b515c (active))
Port 1521	Subnet group default-vpc-d64370ac	Public accessibility Yes
	Subnets subnet-847b99a5 subnet-ba88a384 subnet-050fef5a subnet-041fc60a subnet-e09b7c86 subnet-da4bfc97	Certificate authority rds-ca-2019
		Certificate authority date Aug 22nd, 2024

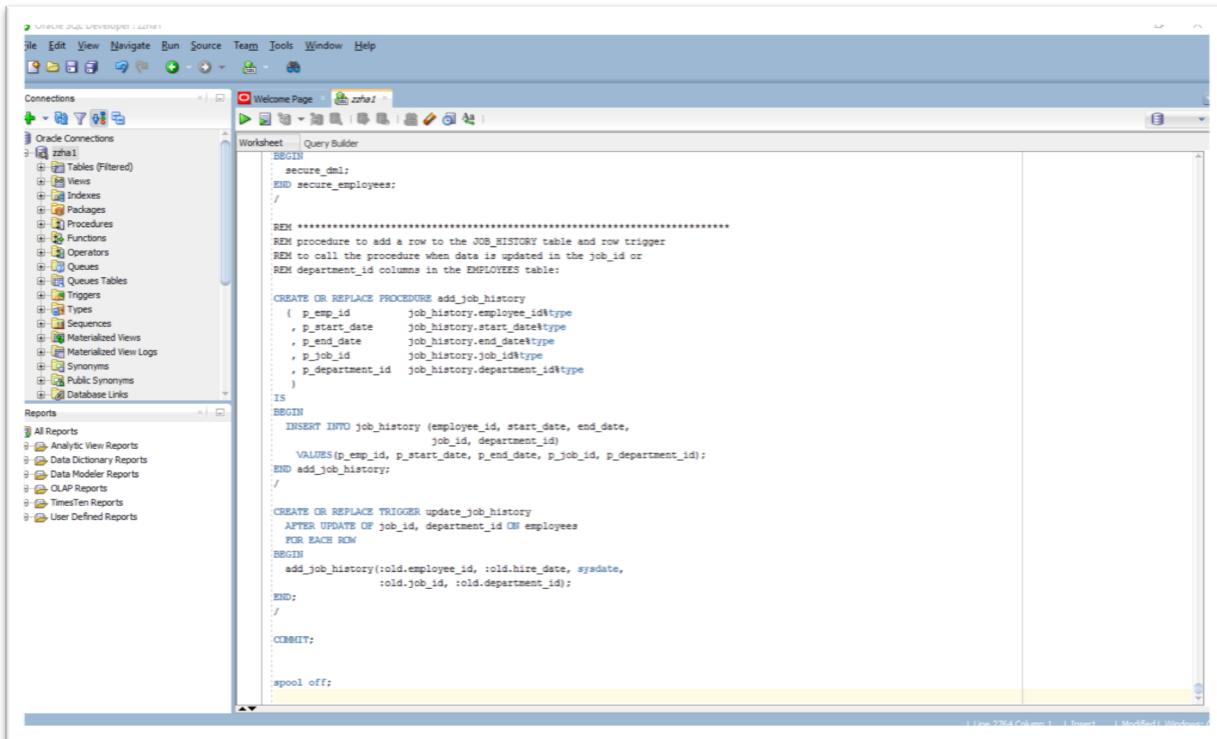
At the bottom, there is a section for 'Security group rules (2)' with two entries, and links for Feedback, English (US), Privacy Policy, and Terms of Use.

Open Oracle SQL Developer and click on New connection.

Enter the below details and click on Test. You should get 'Success'.



Run queries for the HR Database Schema.



```
begin
    secure_dml;
end secure_employees;
/

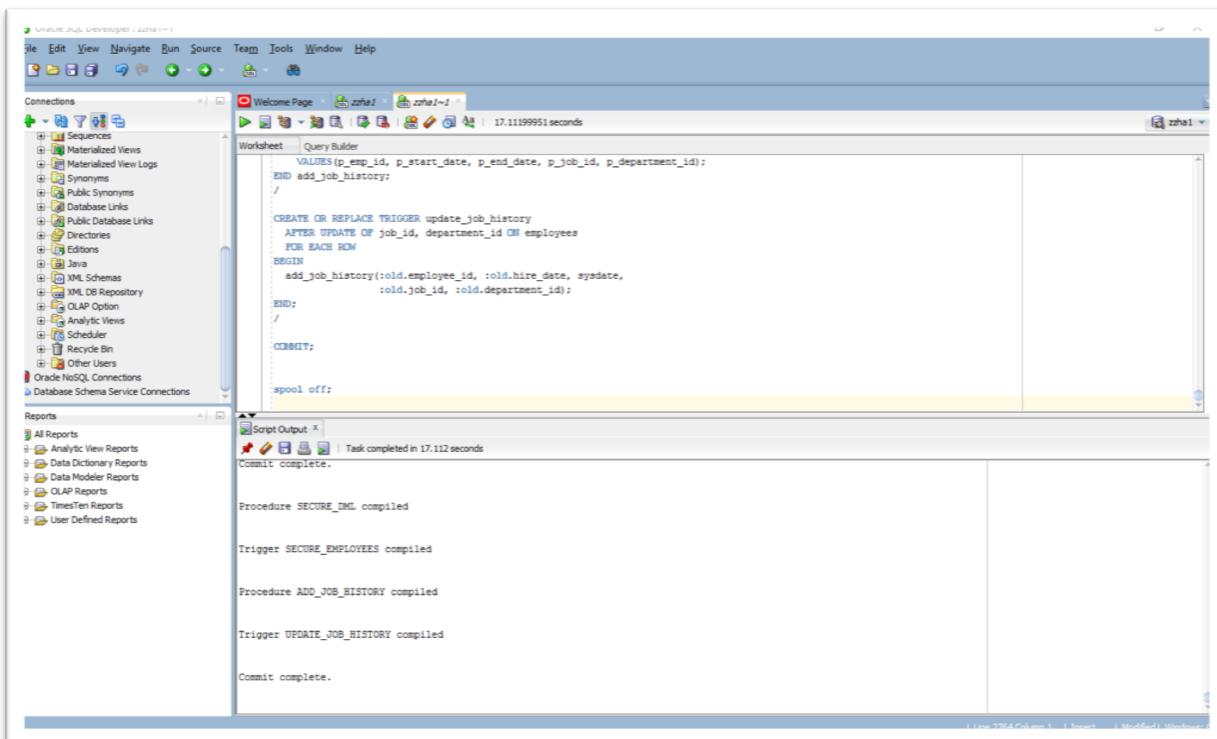
REM ****
REM procedure to add a row to the JOB_HISTORY table and row trigger
REM to call the procedure when data is updated in the job_id or
REM department_id columns in the EMPLOYEES table:

CREATE OR REPLACE PROCEDURE add_job_history
(
    p_emp_id          job_history.employee_id%type,
    p_start_date      job_history.start_date%type,
    p_end_date        job_history.end_date%type,
    p_job_id          job_history.job_id%type,
    p_department_id   job_history.department_id%type
)
IS
BEGIN
    INSERT INTO job_history (employee_id, start_date, end_date,
                           job_id, department_id)
    VALUES(p_emp_id, p_start_date, p_end_date, p_job_id, p_department_id);
END add_job_history;
/


CREATE OR REPLACE TRIGGER update_job_history
AFTER UPDATE OF job_id, department_id ON employees
FOR EACH ROW
BEGIN
    add_job_history(:old.employee_id, :old.hire_date, sysdate,
                    :old.job_id, :old.department_id);
END;
/


COMMIT;

spool off;
```



```
VALUES(p_emp_id, p_start_date, p_end_date, p_job_id, p_department_id);
END add_job_history;
/


CREATE OR REPLACE TRIGGER update_job_history
AFTER UPDATE OF job_id, department_id ON employees
FOR EACH ROW
BEGIN
    add_job_history(:old.employee_id, :old.hire_date, sysdate,
                    :old.job_id, :old.department_id);
END;
/


COMMIT;

spool off;
```

Script Output:

```
| Task completed in 17.112 seconds
| Commit complete.

Procedure SECURE_DML compiled

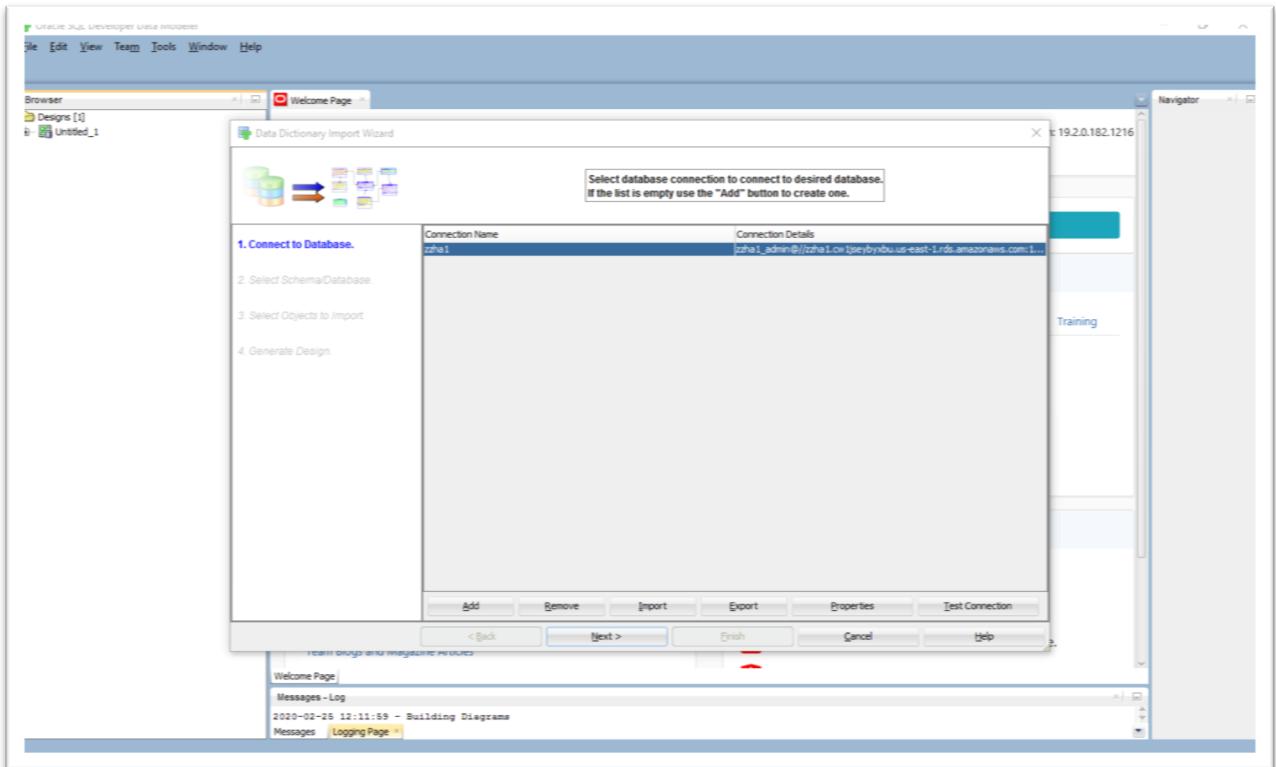
Trigger SECURE_EMPLOYEES compiled

Procedure ADD_JOB_HISTORY compiled

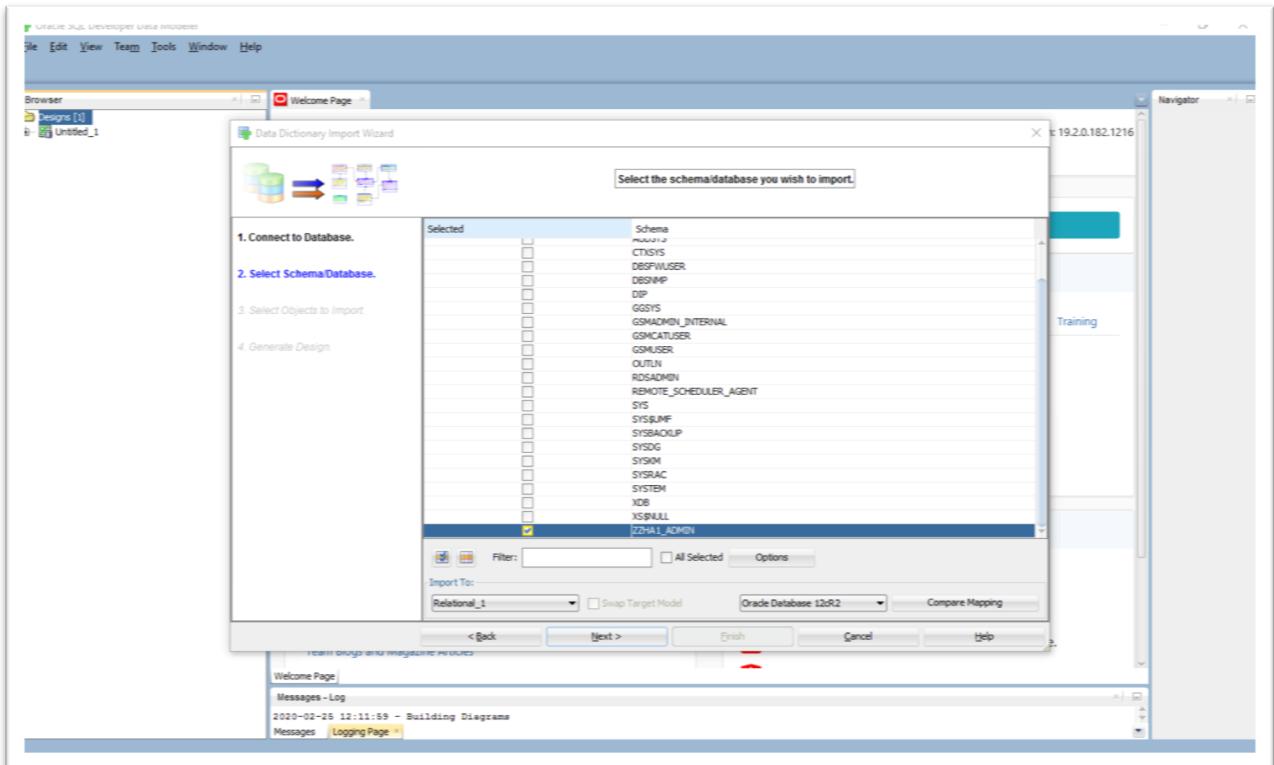
Trigger UPDATE_JOB_HISTORY compiled

Commit complete.
```

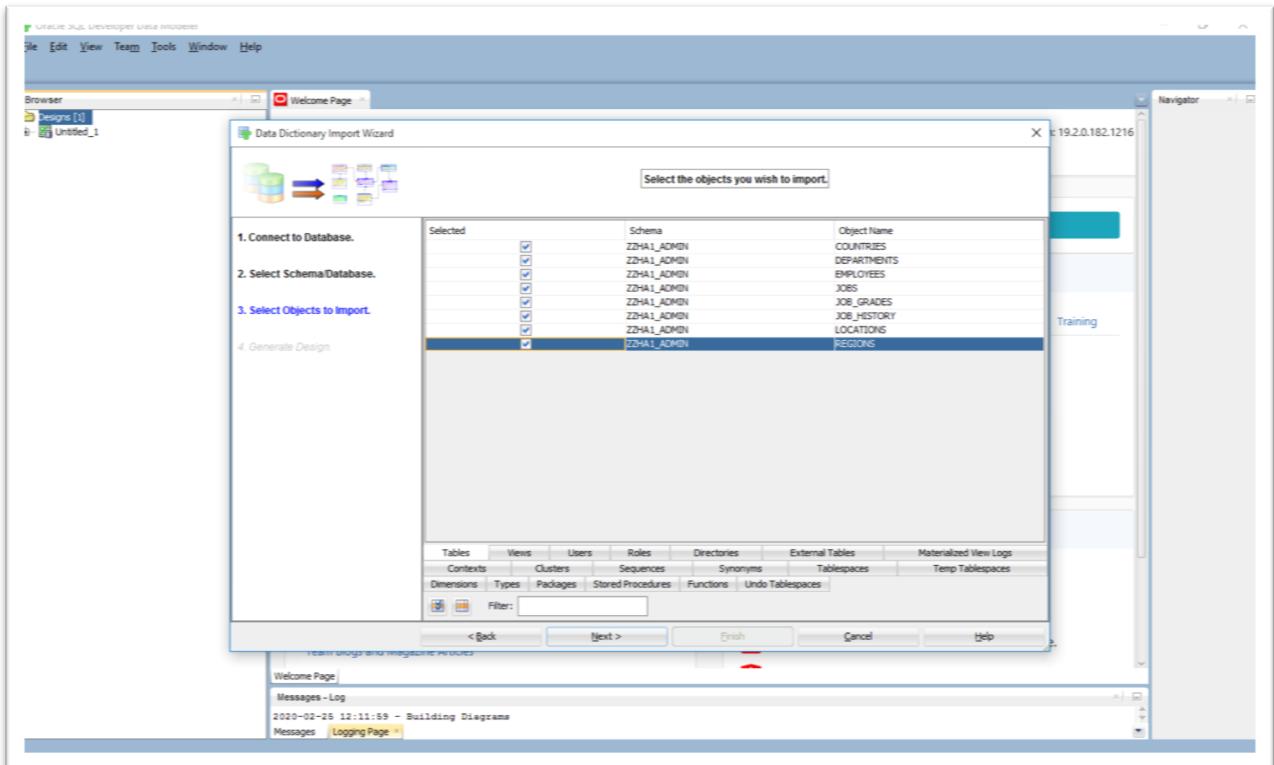
Go to Datamodeler -> Import -> Data Dictionary.



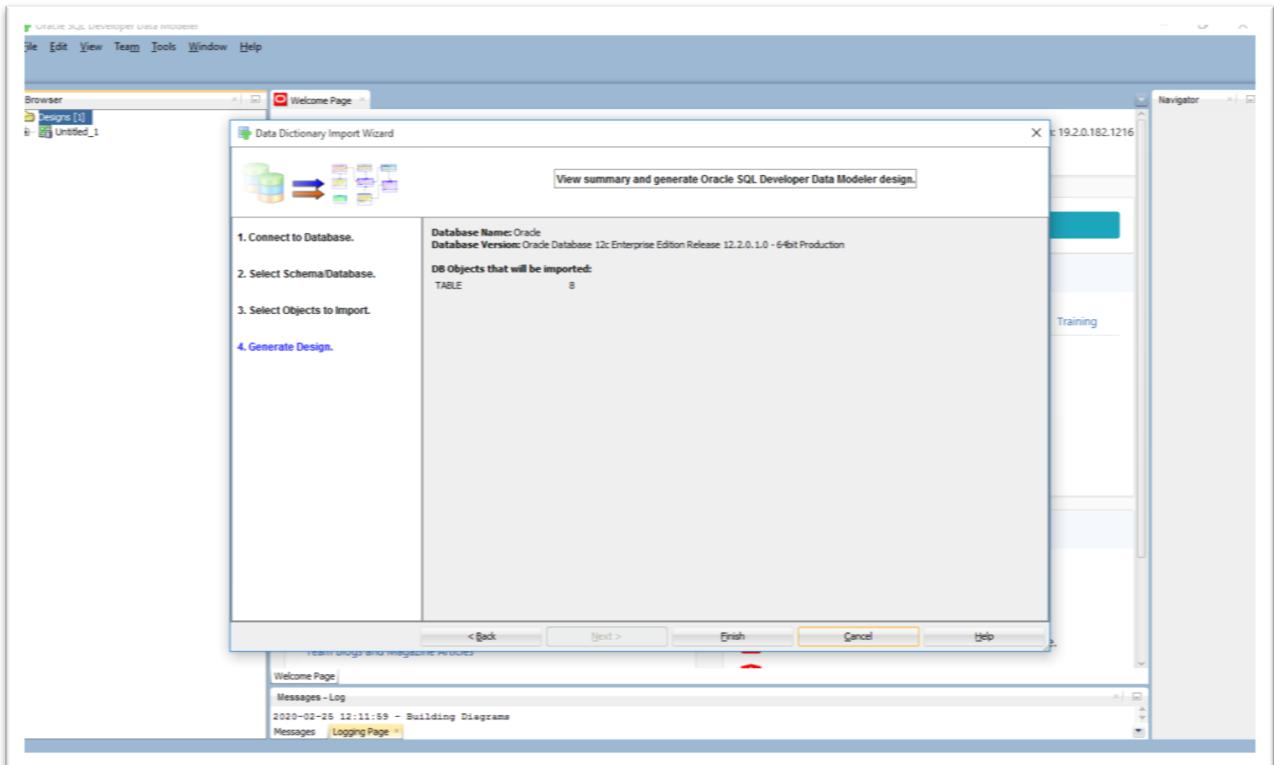
Select your connection name and click on Next.



Select your user name and click on Next.

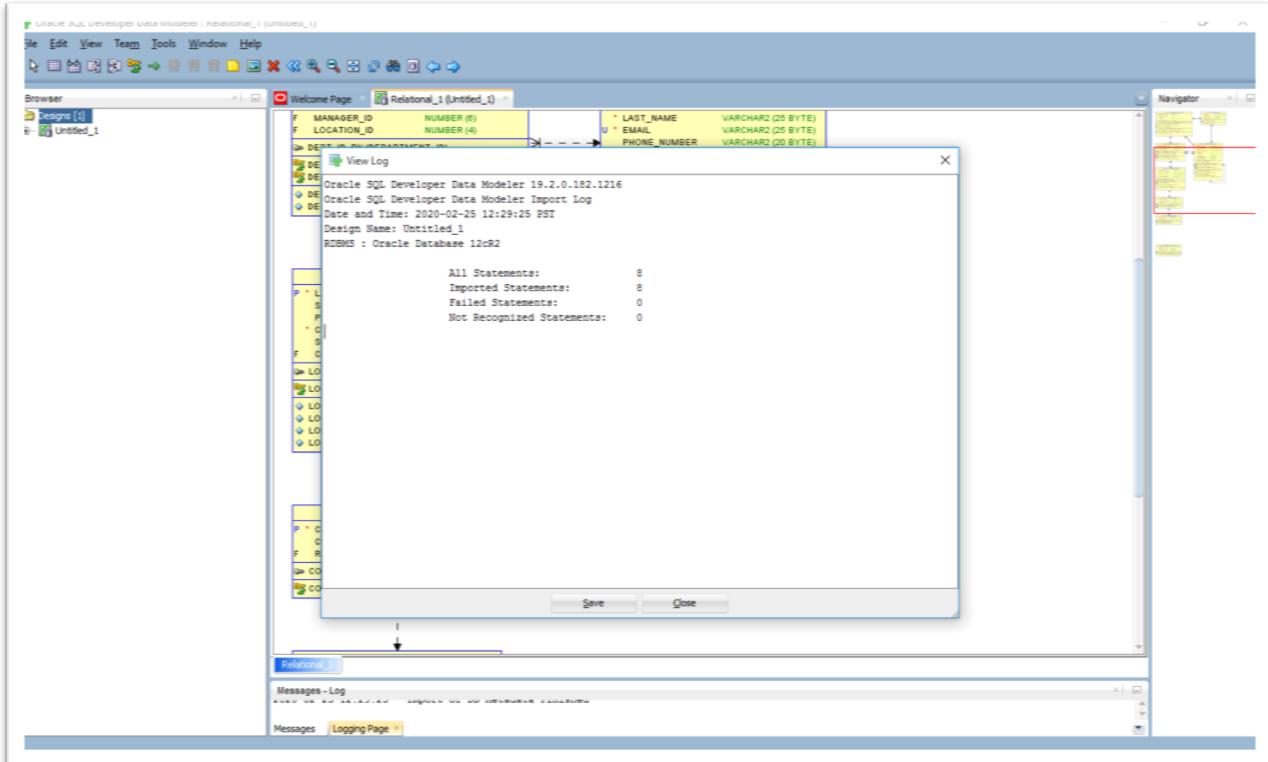


Select all the table and click on Next.

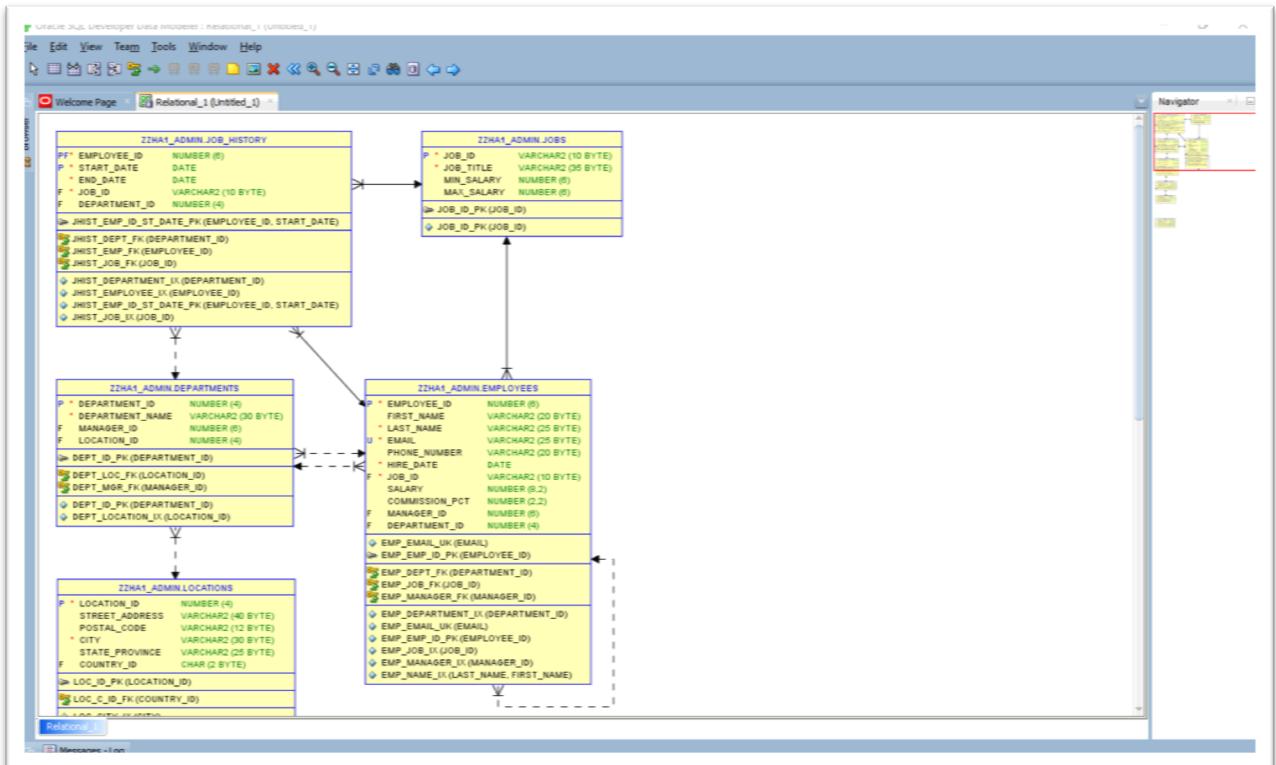


Click on Finish.

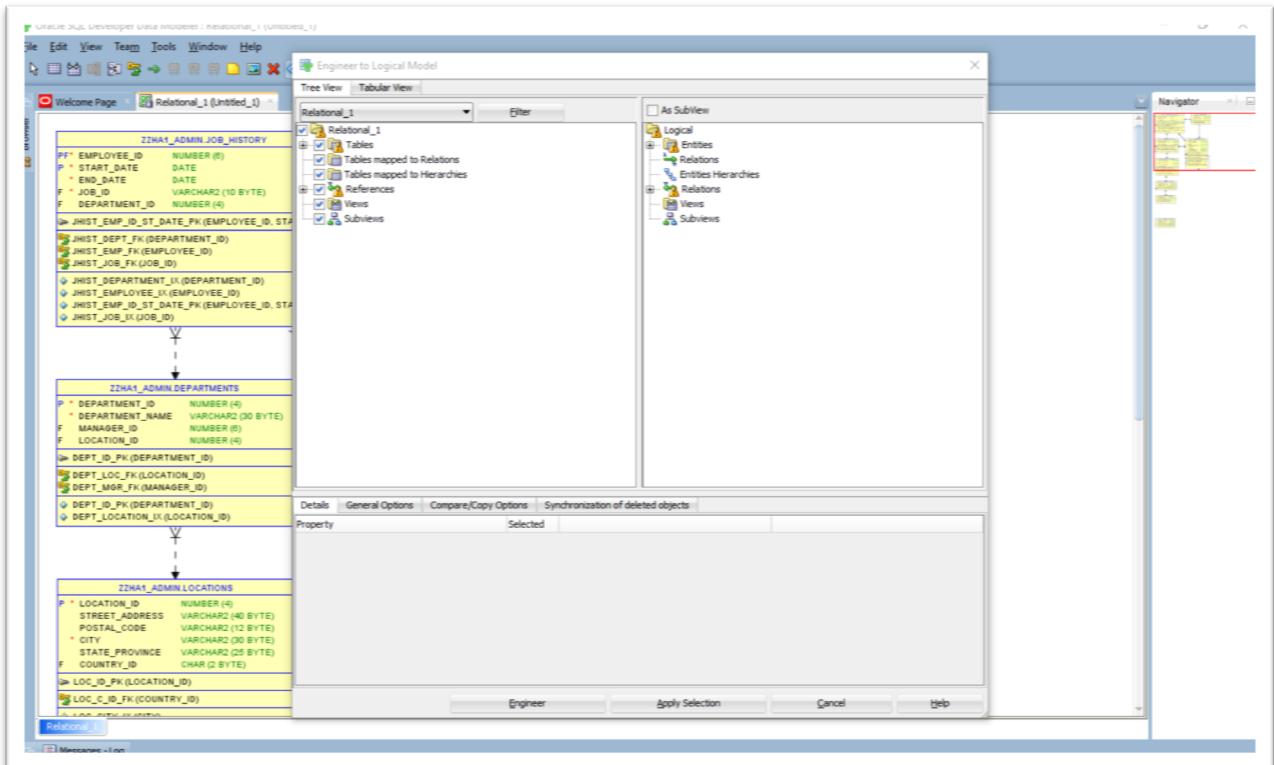
Check the log to verify that all tables were imported successfully.



This is the Relational diagram of the HR database schema.



Click on 'Engineer to Logical Model'.



Click on Engineer.

This is the Logical diagram of the HR Database schema.

