

## CST2355 – Database Systems      Lab Assignment 7

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Hand-in:

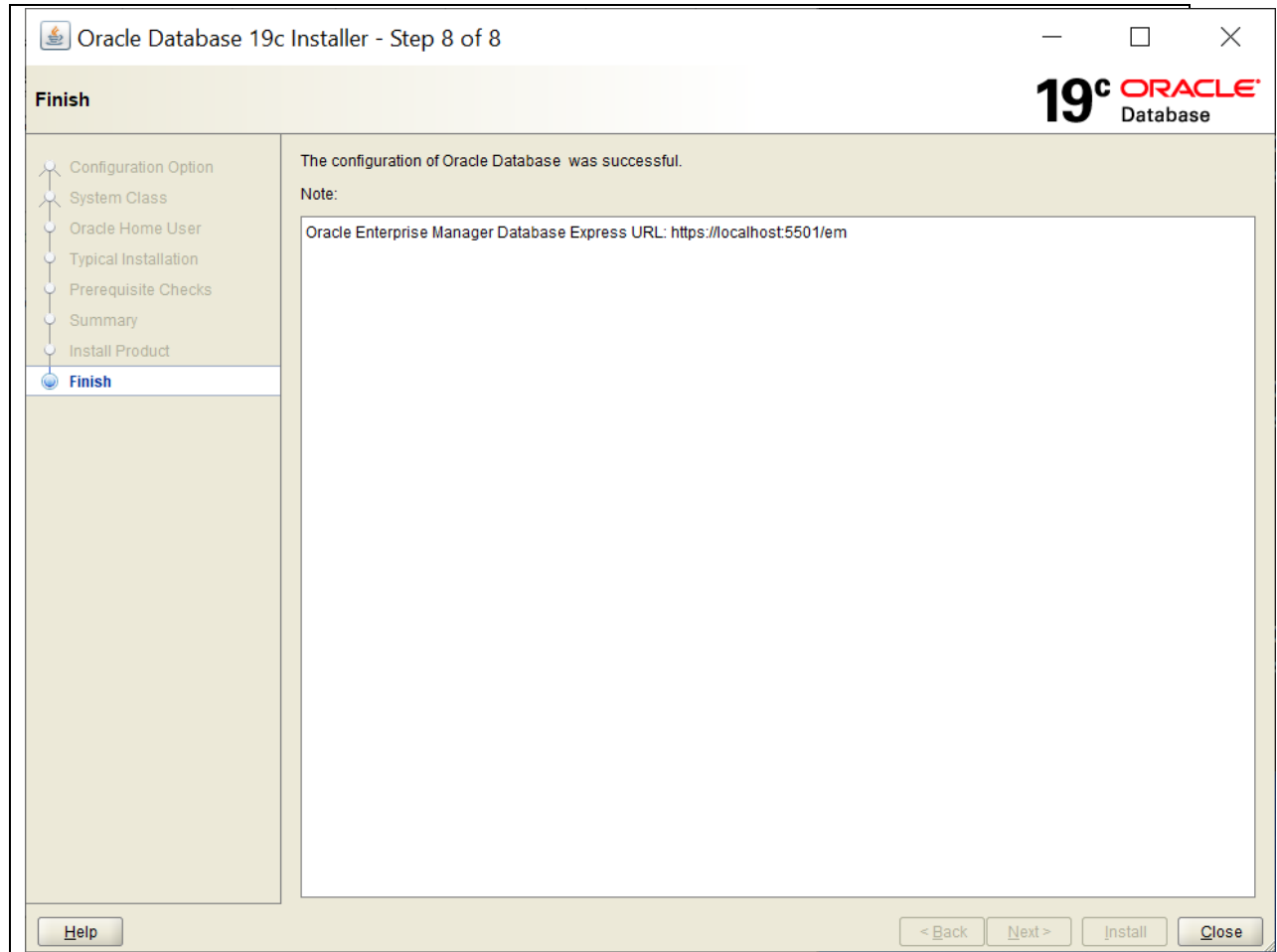
1. The lab assignment will be graded out of a maximum 4 points.
2. This template should be used to submit your lab assignment.
3. Make sure you have enough screenshots to completely document that you have completed all the steps.

### Activities (Steps):

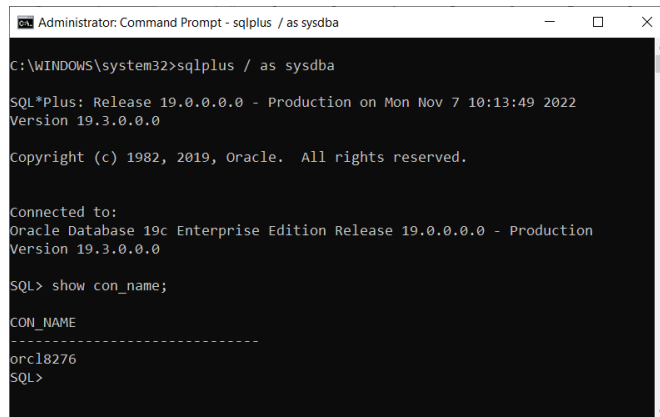
1. In this lab you will be using the Oracle (Version 19c) database management system, and Oracle SQL Developer (which gets installed as part of the 19c enterprise installation). The first step is to get the software installed.
  - 1.1. Download Oracle 19c Enterprise Edition.
    - 1.1.1. Please note that you should download the .zip file from Oracle at:  
<https://www.oracle.com/ca-en/database/technologies/oracle19c-windows-downloads.html>  
This is the current stable long-term release for Oracle Enterprise.
    - 1.1.2. Create an Oracle installation folder, using a folder name that is short and does not contain blanks. (e.g., C:\oracle19cinstall) Then, unzip the compressed file **into the Oracle installation folder**.
  - 1.2. Open a “cmd” window as administrator (i.e., **Select “Run as administrator”**). Then, navigate in the cmd window to the folder (under your installation folder in step 2) where the setup.exe file has been unzipped. Then, run the following command.
    - 1.2.1.1. On Windows 10: **make sure you are running the command as administrator** and use the following command line. You need to have changed the working directory to the directory where the setup.exe program was unzipped. (Don’t just click on it in Windows Explorer....)  
  
**setup -ignorePrereq -J"-Doracle.install.db.validate.supportedOSCheck=false"**
  - 1.2.2. The installation program is a Java executable, and is notoriously tricky. Sometimes it will pop-up a window underneath the main window; leaving you waiting forever because you did not realize that the program is waiting for a response.

- 1.2.3. Respond appropriately to the installation customization queries. The critical steps are highlighted – they are mandatory for this course.
- 1.3. Step 1: Configure Security Updates:
  - 1.3.1. Email option – leave blank, does not apply
  - 1.3.2. **Deselect the update notification option.** You do NOT want to receive security updates.
  - 1.3.3. Press 'Next'
  - 1.3.4. Ignore the warning, press 'Yes'.
- 1.4. Step 2: Installation Option:
  - 1.4.1. Select 'Create and configure a database', then press 'Next'
- 1.5. Step 3: System Class:
  - 1.5.1. **Select 'Desktop Class',** then 'Next'
- 1.6. Step4: Home User Selection
  - 1.6.1. Select **'Use Built-in Windows Account',** then press 'Next'
  - 1.6.2. Ignore the security warning and proceed.
- 1.7. Step 5: Typical Installation Configuration:
  - 1.7.1. Accept defaults EXCEPT for the following:
    - 1.7.1.1. Global DB name: change to **'orcl'**
    - 1.7.1.2. **CAREFUL: Make sure to uncheck the 'create as container database' checkbox**
    - 1.7.1.3. Admin (SYS) password: *'yourFirstNamesOracle123'* (e.g., **dougOracle123 feiOracle123**)
      - 1.7.1.3.1. If you receive a warning('INS-30011') that your password strength is poor, ignore it
      - 1.7.1.3.2. 'Next' / 'Yes' to continue
- 1.8. Step 6: Prerequisite Check is performed. This may take some time. Sometimes the installer will pop-up a window underneath a visible window (so that you cannot see the pop-up) so some manual intervention may be required.
- 1.9. Step 7: Summary of response is displayed. 'Save Response File' and 'Install'.
- 1.10. Step 8: Install Product message is displayed. If you receive a Windows firewall message, allow access for Java
  - 1.10.1. Several components are installed
  - 1.10.2. In the Password Management screen, change the password for user SYSTEM to : *'yourFirstNamesystem'* (e.g., **dougsystem**). **'feisystem'** You may unlock and change passwords for some other accounts at the same time (or just leave them defaulted for now. The website [https://www.oracle.com/wiki/List\\_of\\_default\\_database\\_users](https://www.oracle.com/wiki/List_of_default_database_users) has a list of default Oracle usernames and default passwords.
  - 1.10.3. 'OK'

- 1.10.4. Ignore any additional password standards warning message. 'Continue? Yes' / 'OK'
- 1.10.5. Windows 10: If Services for Microsoft Transaction Server cannot start – that is OK. Click Next and Yes when asked are you sure you want to continue.
- 1.11. Step 9 Installation was Successful message is displayed. **Take your screen shot before closing the window and paste it below** Then, select 'Close'
- 1.11.1. **Paste your screen shot showing successful installation below.**



- 1.12. Confirm you are able to **connect** to the database. (**Open a cmd window using ‘run as administrator’ and run the ‘sqlplus / as sysdba’ command line.**) Once connected, run the command ‘show con\_name;’ which will show the connection name for your default instance. Here is mine:



```
Administrator: Command Prompt - sqlplus / as sysdba
C:\WINDOWS\system32>sqlplus / as sysdba

SQL*Plus: Release 19.0.0.0.0 - Production on Mon Nov 7 10:13:49 2022
Version 19.3.0.0.0

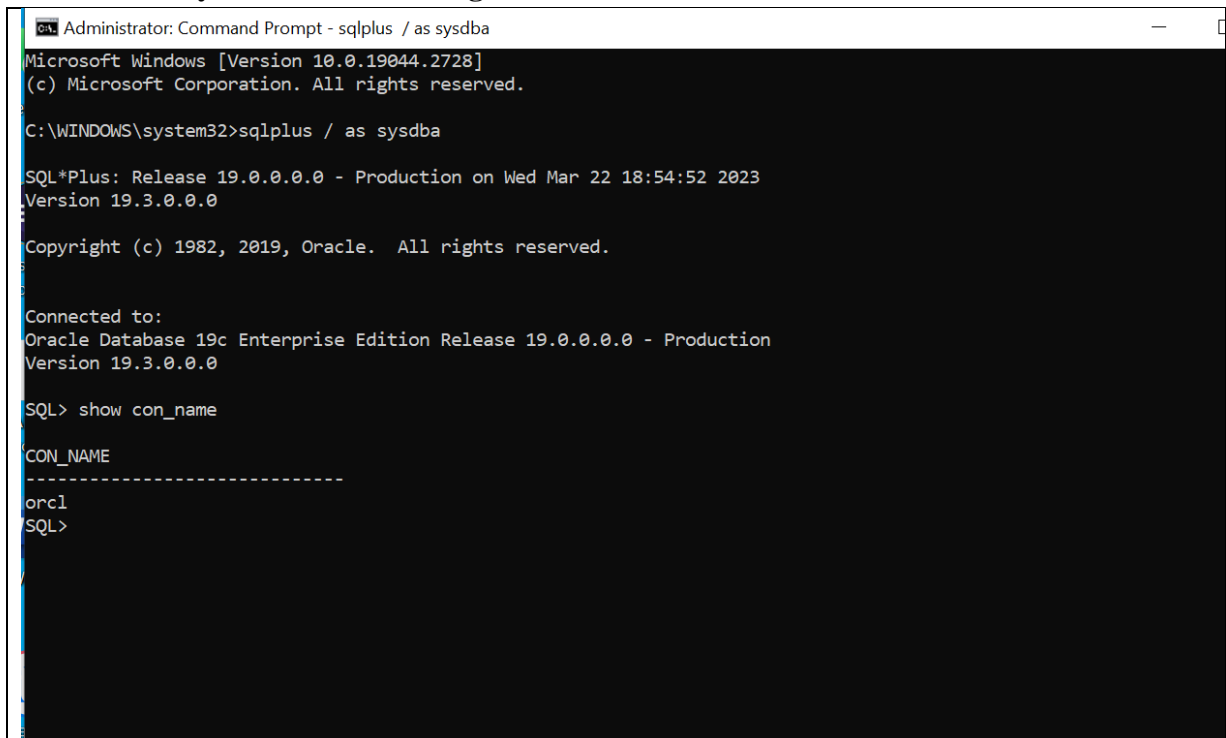
Copyright (c) 1982, 2019, Oracle. All rights reserved.

Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0

SQL> show con_name;

CON_NAME
-----
orcl8276
SQL>
```

1.13. **Paste your session showing a successful connection below.**



```
Administrator: Command Prompt - sqlplus / as sysdba
Microsoft Windows [Version 10.0.19044.2728]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>sqlplus / as sysdba

SQL*Plus: Release 19.0.0.0.0 - Production on Wed Mar 22 18:54:52 2023
Version 19.3.0.0.0

Copyright (c) 1982, 2019, Oracle. All rights reserved.

Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0

SQL> show con_name

CON_NAME
-----
orcl
SQL>
```

2. Now that Oracle is installed, we will use **sqlplus** to create the database and populate some test data using the scripts supplied in Brightspace for this lab.

2.1. Copy the **lab7-create.sql** and **lab7-cleanup.sql** scripts to a convenient folder on your PC.

2.2. Open a cmd window ('run as administrator') and navigate to the folder where your sql scripts are stored. (using the cd command....)

2.3. Inside the command window, startup sql plus as follows: 'sqlplus / as sysdba'

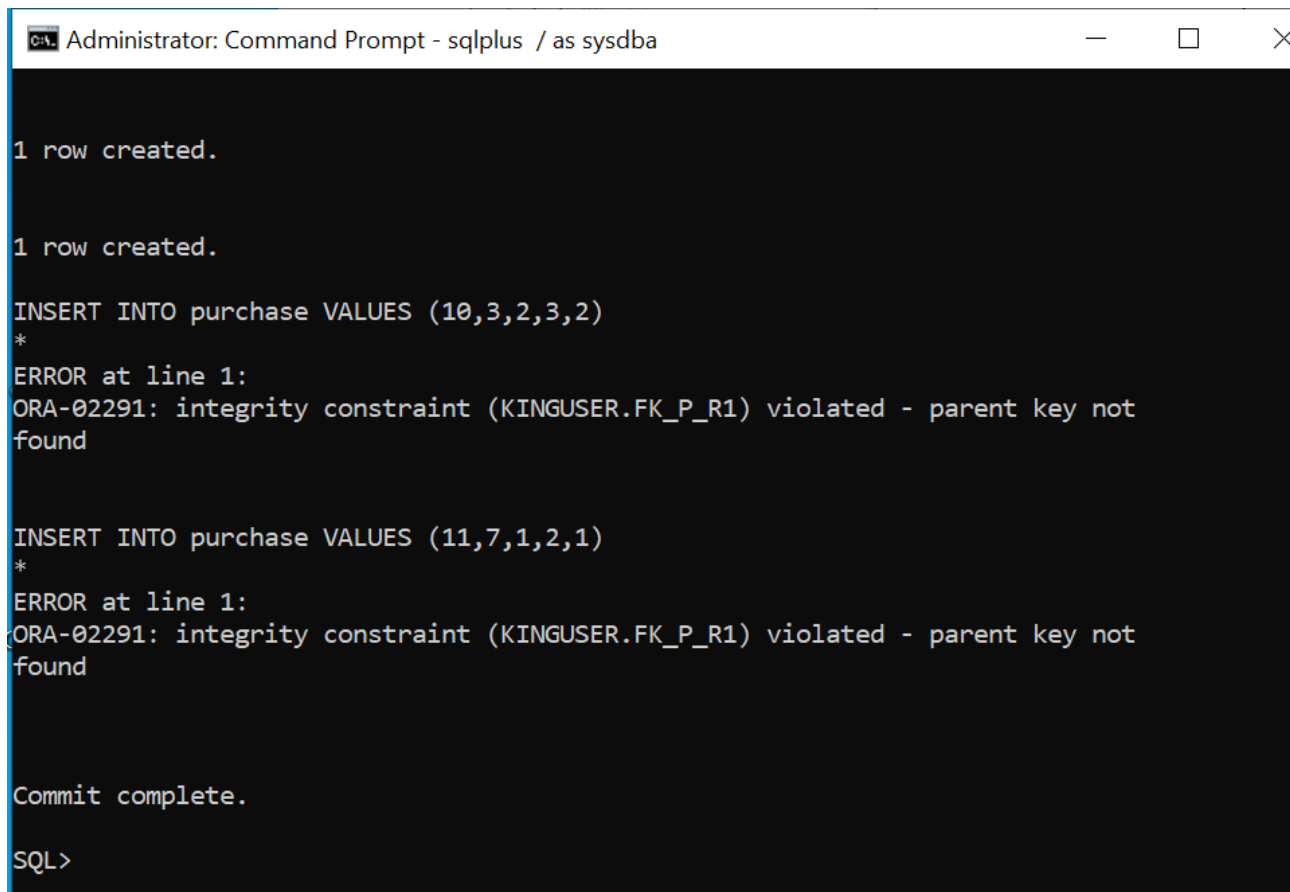
2.4. This will again connect you as sysadmin without needing a password.

2.5. Once connected, issue the following command inside sqlplus

@lab7-create.sql

2.5.1. This should execute the script from the current folder, and create the database. **Please note:** you should expect some error messages during the script; there are some data insertion errors that you will need to clean-up, and some other changes to be made later in the lab. For now, just ensure that the script is found and that all is OK except for the errors caused by the failed inserts.

2.5.1.1. Provide a screenshot of the initial run of the script.



```
Administrator: Command Prompt - sqlplus / as sysdba

1 row created.

1 row created.

INSERT INTO purchase VALUES (10,3,2,3,2)
*
ERROR at line 1:
ORA-02291: integrity constraint (KINGUSER.FK_P_R1) violated - parent key not
found

INSERT INTO purchase VALUES (11,7,1,2,1)
*
ERROR at line 1:
ORA-02291: integrity constraint (KINGUSER.FK_P_R1) violated - parent key not
found

Commit complete.

SQL>
```

2.5.2. Use sqlplus to run the script **lab7-cleanup.sql** using sqlplus. This will undo the effects of the first script.

3. Now you will fix the creation script. Open the lab7-create.sql script using a text editor and CAREFULLY make the following changes:

3.1. Change the username for the user that is assigned the application administrator role to 'yournameUser' and change the password for that user.

- 3.2. Modify the insert statements to fix the invalid telephone numbers and postal codes.
- 3.3. Update the trigger on the `retaillocation` table to include both a check on postalcode and a check on the telephone number. **Provide a screenshot of your updated trigger below:**

```
CREATE OR REPLACE TRIGGER retaillocation_check
BEFORE INSERT OR UPDATE
ON retaillocation
FOR EACH ROW
DECLARE
    var_pc varchar(45) := :NEW.postalcode;
    var_tn varchar(45) := :NEW.telephonenumber;
BEGIN
    sp_checkInvalidPostalCode (var_pc);
    sp_checkInvalidTelephone (var_tn);
END;
/
```

4. Use a texteditor to edit the **lab7-cleanup.sql** script to be able to cleanup based on your new `yournameUser` username. Provide a screenshot showing the updated contents of the script below

```
-- Cleanup for lab7

DROP PROCEDURE lanUser.sp_checkInvalidPostalCode;
DROP PROCEDURE lanUser.sp_checkInvalidTelephone;
DROP USER lanUser CASCADE;
DROP USER testUser;
DROP ROLE applicationAdmin;
DROP ROLE applicationUser;
DROP TABLESPACE CST2355 INCLUDING CONTENTS AND DATAFILES;

-- End of File|
```

5. Create a screenshot showing you running your version of the `lab7-create.sql` script and including (some of) the output. You now have the storage, user, roles, tables, triggers, and stored procedures all in place. Provide the screenshot below:

```
Administrator: Command Prompt - sqlplus / as sysdba

1 row created.

1 row created.

1 row created.

1 row created.

1 row created.

1 row created.

1 row created.

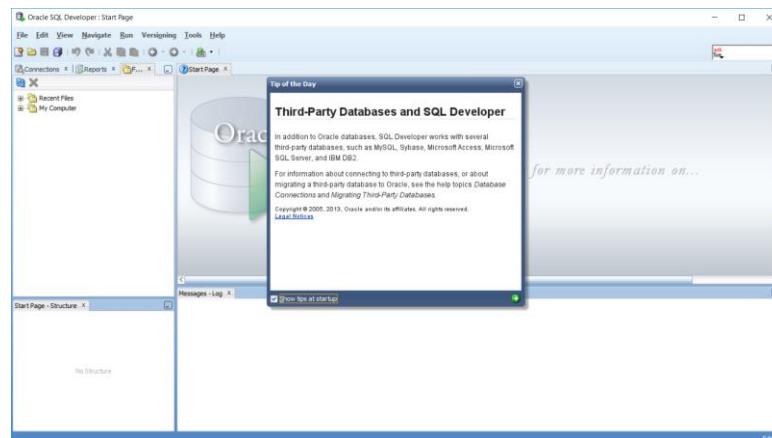
Commit complete.

SQL>
```

- Download and install the Oracle SQL Developer (Including JDK) from the Oracle downloads site at:

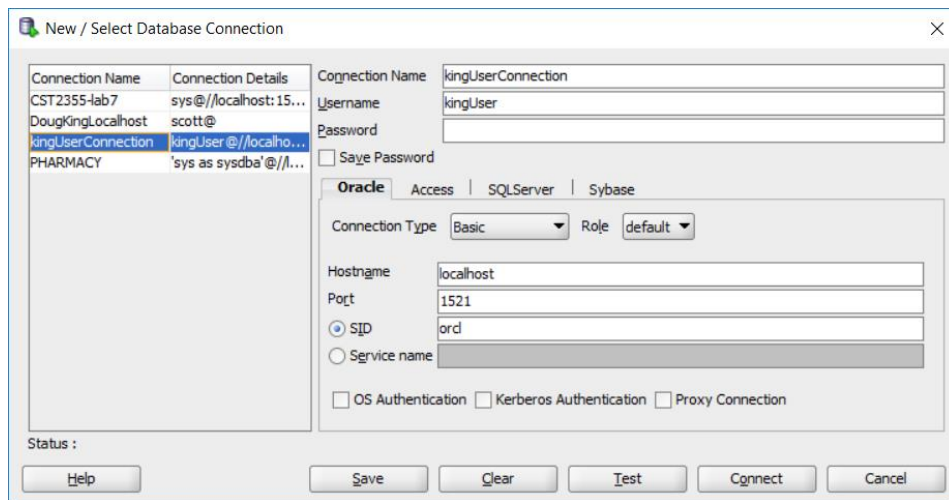
[Oracle SQL Developer Downloads](#)

and follow the installation instructions. Then, use the Windows Start menu to open the 'Oracle SQL Developer' tool in the Oracle tools folder. You should see something like this:



6.1.1. You need to create a new connection called *yournameUserConnection* that connects to the local Oracle database instance as *yournameUser* using the password you used in the creation script.

6.1.1.1. Click on the new connection button. You should see something like this:



6.1.1.2. You likely have less database type options, but you should fill in the form: select 'Oracle' and change the SID to the instance name that you had captured earlier ('show con\_name' using sqlplus). Mine is 'orcl'. You should test your connection and provide the confirmation screen below.



New / Select Database Connection

Connection Name	Connection Details
lanUserConnection	lanUser@//localh...

Name:

Database Type:

**User Info** Proxy User

Authentication Type:

Username:  Role:

Password:  ☐ Save Password

Connection Type:

**Details** Advanced

Hostname:

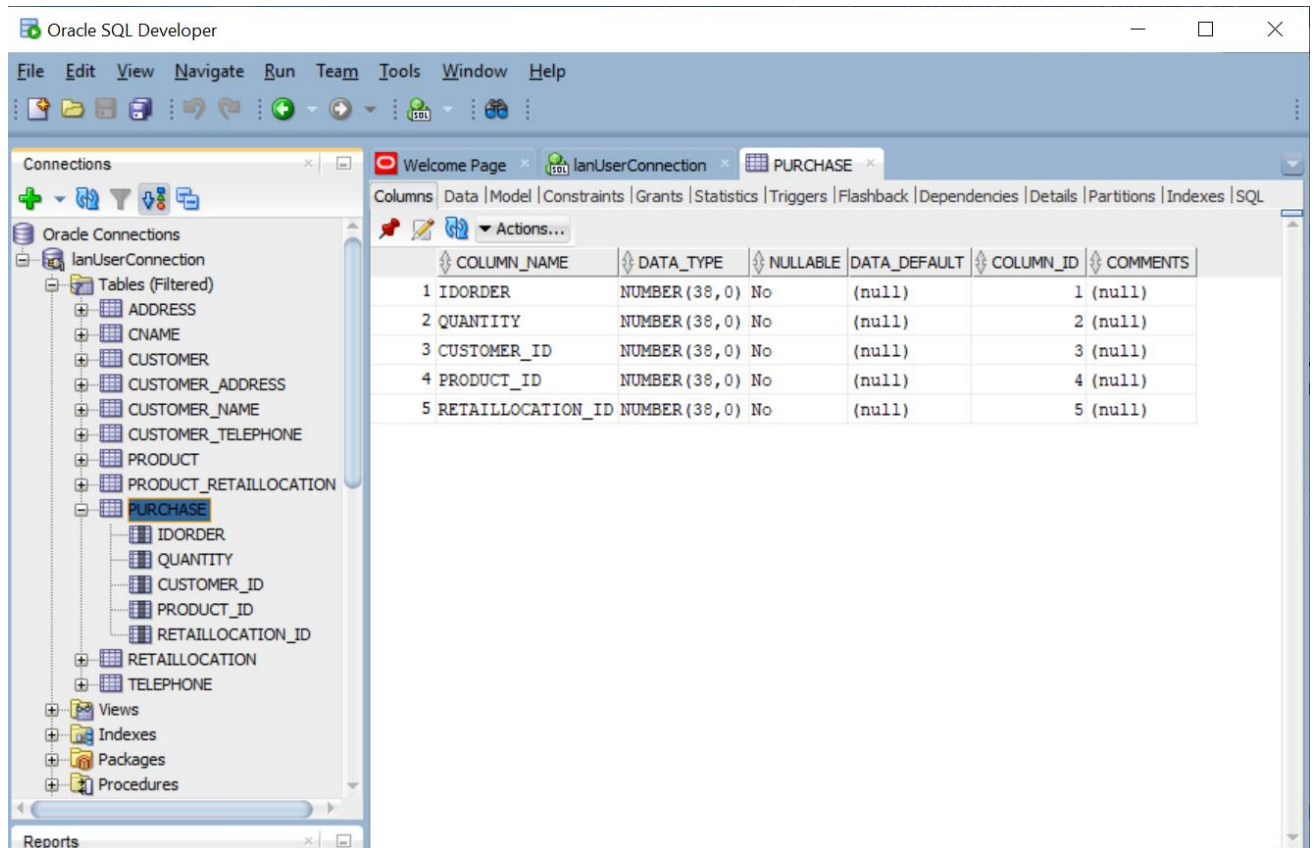
Port:

☒ SID

☐ Service name

Status :

6.1.2. Once the connection is in place, Open it (providing the password for your new user) to view the contents. Provide a screenshot showing the set of tables.



6.1.3. Use the query editor in SQL Developer (or sqlplus) to provide examples of trying to insert an invalid address, an invalid telephone, and a retaillocation with both problems. Provide your screenshots below.

6.1.3.1. Invalid address (postalcode):

The screenshot shows the SQL Developer interface with a window titled 'lanUserConnection'. The 'Query Builder' tab is active, displaying an SQL script with three INSERT statements. The 'Script Output' window below shows the execution results, including error messages for invalid postal codes.

```

Welcome Page x lanUserConnection x
0.054 seconds
lanUserConnection

Worksheet Query Builder

INSERT INTO address VALUES (9,'11 Lewis Street','Ottawa','Ontario','k2S1E6');
INSERT INTO address VALUES (10,'11 Lewis Street','Ottawa','Ontario','K2S1EF');
INSERT INTO address VALUES (11,'11 Lewis Street','Ottawa','Ontario','K2S1EF3');

Script Output x
Task completed in 0.054 seconds

ORA-06512: at "LANUSER.SP_CHECKINVALIDPOSTALCODE", line 6
ORA-06512: at "LANUSER.ADDRESS_CHECK", line 4
ORA-04088: error during execution of trigger 'LANUSER.ADDRESS_CHECK'

Error starting at line : 2 in command -
INSERT INTO address VALUES (10,'11 Lewis Street','Ottawa','Ontario','K2S1EF')
Error report -
ORA-20000: The postal code must be 6 characters in length of the form: "A9A9A9"!
ORA-06512: at "LANUSER.SP_CHECKINVALIDPOSTALCODE", line 6
ORA-06512: at "LANUSER.ADDRESS_CHECK", line 4
ORA-04088: error during execution of trigger 'LANUSER.ADDRESS_CHECK'

Error starting at line : 3 in command -
INSERT INTO address VALUES (11,'11 Lewis Street','Ottawa','Ontario','K2S1EF3')
Error report -
ORA-20000: The postal code must be 6 characters in length of the form: "A9A9A9"!
ORA-06512: at "LANUSER.SP_CHECKINVALIDPOSTALCODE", line 6
ORA-06512: at "LANUSER.ADDRESS_CHECK", line 4
ORA-04088: error during execution of trigger 'LANUSER.ADDRESS_CHECK'

| Line 3 Column 80 | Insert | Modified | Windows: CF
  
```

#### 6.1.3.2. Invalid telephone:

The screenshot shows the SQL Developer interface with a 'Query Builder' tab. The SQL editor contains three INSERT statements for a 'telephone' table. The 'Script Output' window below shows the execution results, including error messages for the second and third statements.

```

INSERT INTO telephone VALUES (7,'work','16136784568');
INSERT INTO telephone VALUES (8,'work','1(613)678-4568');
INSERT INTO telephone VALUES (9,'work','613-678-4568');
  
```

Script Output x

Task completed in 0.137 seconds

```

Error starting at line : 5 in command -
INSERT INTO telephone VALUES (7,'work','16136784568')
Error report -
ORA-20000: The telephone number must be of the form: "(xxx) xxx-xxxx"!
ORA-06512: at "LANUSER.SP_CHECKINVALIDTELEPHONE", line 6
ORA-06512: at "LANUSER.TELEPHONE_CHECK", line 4
ORA-04088: error during execution of trigger 'LANUSER.TELEPHONE_CHECK'

Error starting at line : 6 in command -
INSERT INTO telephone VALUES (8,'work','1(613)678-4568')
Error report -
ORA-20000: The telephone number must be of the form: "(xxx) xxx-xxxx"!
ORA-06512: at "LANUSER.SP_CHECKINVALIDTELEPHONE", line 6
ORA-06512: at "LANUSER.TELEPHONE_CHECK", line 4
ORA-04088: error during execution of trigger 'LANUSER.TELEPHONE_CHECK'

Error starting at line : 7 in command -
INSERT INTO telephone VALUES (9,'work','613-678-4568')
Error report -
  
```

Line 7 Column 56 | Insert | Modified | Windows: C

6.1.3.3. Invalid retaillocation: (3 possibilities)

6.1.3.3.1. Invalid telephone field:

Worksheet Query Builder

```
INSERT INTO retaillocation VALUES (4,'519-789-0123','100 College Avenue','Guelph','Ontario','N1H2G3');
```

Script Output x

Task completed in 0.045 seconds

Error starting at line : 9 in command -  
 INSERT INTO retaillocation VALUES (4,'519-789-0123','100 College Avenue','Guelph','Ontario','N1H2G3')  
 Error report -  
 ORA-20000: The telephone number must be of the form: "(xxx) xxx-xxxx"!  
 ORA-06512: at "LANUSER.SP\_CHECKINVALIDTELEPHONE", line 6  
 ORA-06512: at "LANUSER.RETAILLOCATION\_CHECK", line 6  
 ORA-04088: error during execution of trigger 'LANUSER.RETAILLOCATION\_CHECK'

#### 6.1.3.4. Invalid postalcode field:

Worksheet Query Builder

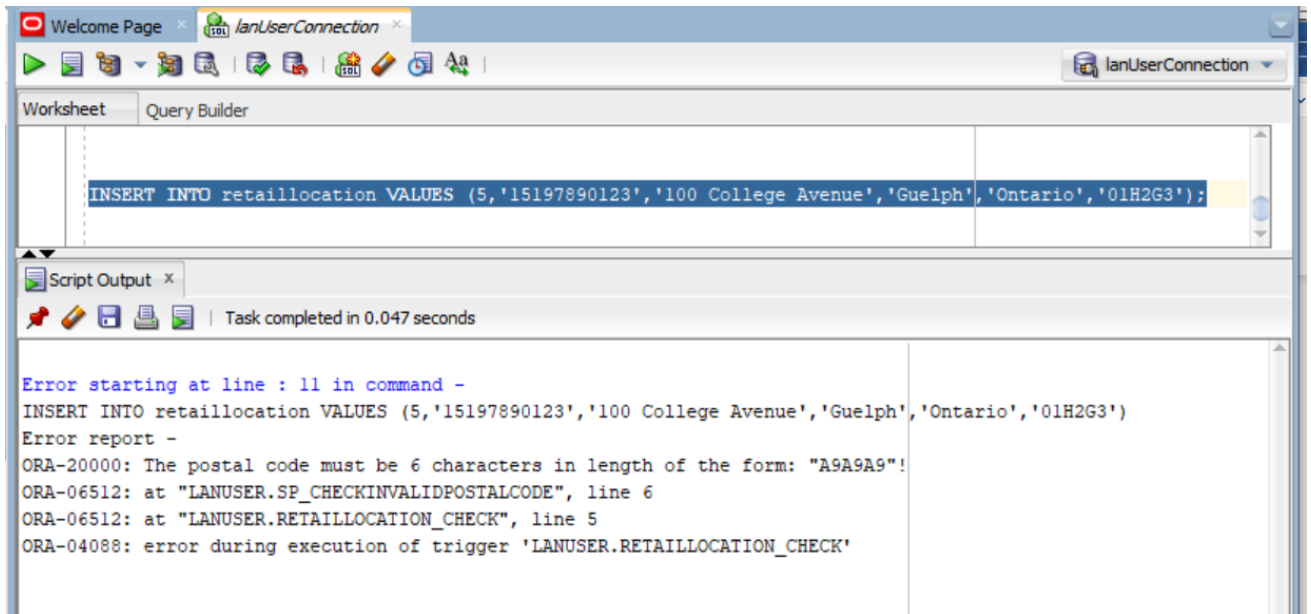
```
INSERT INTO retaillocation VALUES (5,'(519) 789-0123','100 College Avenue','Guelph','Ontario','01H2G3');
```

Script Output x

Task completed in 0.105 seconds

Error starting at line : 11 in command -  
 INSERT INTO retaillocation VALUES (5,'(519) 789-0123','100 College Avenue','Guelph','Ontario','01H2G3')  
 Error report -  
 ORA-20000: The postal code must be 6 characters in length of the form: "A9A9A9"!  
 ORA-06512: at "LANUSER.SP\_CHECKINVALIDPOSTALCODE", line 6  
 ORA-06512: at "LANUSER.RETAILLOCATION\_CHECK", line 5  
 ORA-04088: error during execution of trigger 'LANUSER.RETAILLOCATION\_CHECK'

6.1.3.4.1. Both postcode and telephone are invalid (don't try to fix the trigger... it is ok if only 1 error is shown):



7. Once you have embedded all of your screenshots, submit the file in Brightspace and you're done!