Oracle External Tables

Summary: In this lab, you will learn about Oracle external tables that allow you to access data in flat files as if it were in tables.

What is an Oracle external table

An external table is a table whose data come from flat files stored outside of the database.

Oracle can parse any file format supported by the SQL*Loader.

Why do you need to use external tables

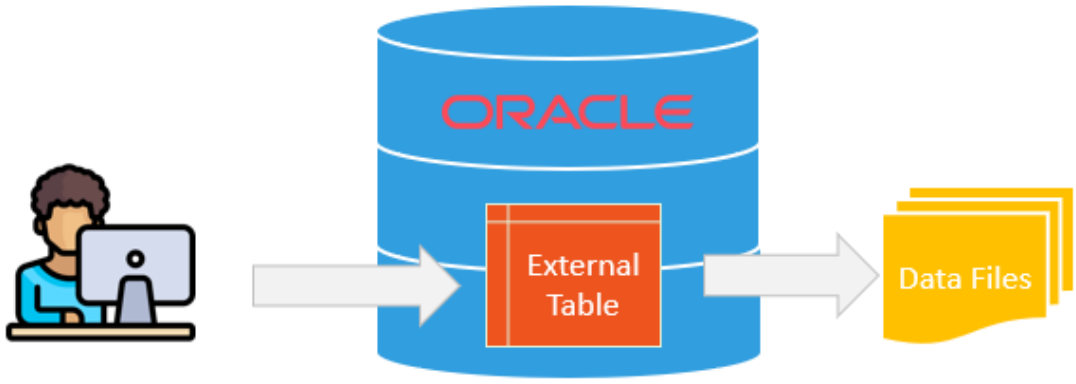
The external tables can be useful in the ETL process of data warehouses because the data does not need to be staged and can be queried in parallel.

Notice that you should not use external tables for frequently accessed tables.

Creating an Oracle external table steps

You follow these steps to create an external table:

- First, create a directory which contains the file to be accessed by Oracle using the `CREATE DIRECTORY` statement.
- Second, grant `READ` and `WRITE` access to users who access the external table using the `GRANT` statement.
- Third, create the external table by using the `CREATE TABLE ORGANIZATION EXTERNAL` statement.



Creating an Oracle external table example

Here is a CSV file that has two columns: language id and name.

languages.csv

```
1,Acholi
2,Afrikaans
3,Akan
4,Albanian
5,Amharic
6,Arabic
7,Ashante
8,Asl
9,Assyrian
10,Azerbaijani
11,Azeri
12,Bajuni
```

We will create an external table that maps to the `languages.csv` file.

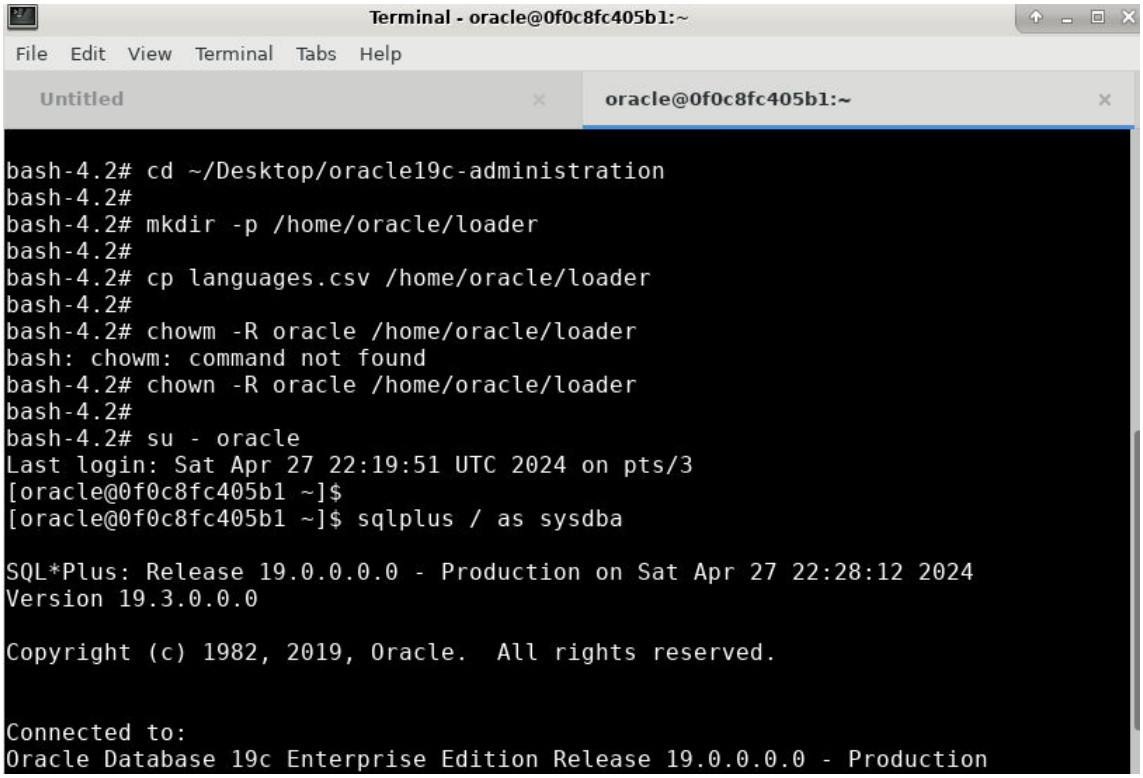
1) Create a directory object

First, place the `language.csv` file in the `/home/oracle/loader` directory by running following commands in the terminal as **root** user:

```
cd ~/Desktop/oracle19c-administration

mkdir -p /home/oracle/loader

cp languages.csv /home/oracle/loader

chown -R oracle /home/oracle/loader
```

Second, log in to the Oracle database using the `sysdba` user via the SQL*Plus program:

```
su - oracle

sqlplus / as sysdba
```



Third, create a new directory object called `lang_external` that maps to the `/home/oracle/loader` directory:

```
SQL> create directory lang_external as '/home/oracle/loader';
```

2) Grant `READ` and `WRITE` access on the directory object to users:

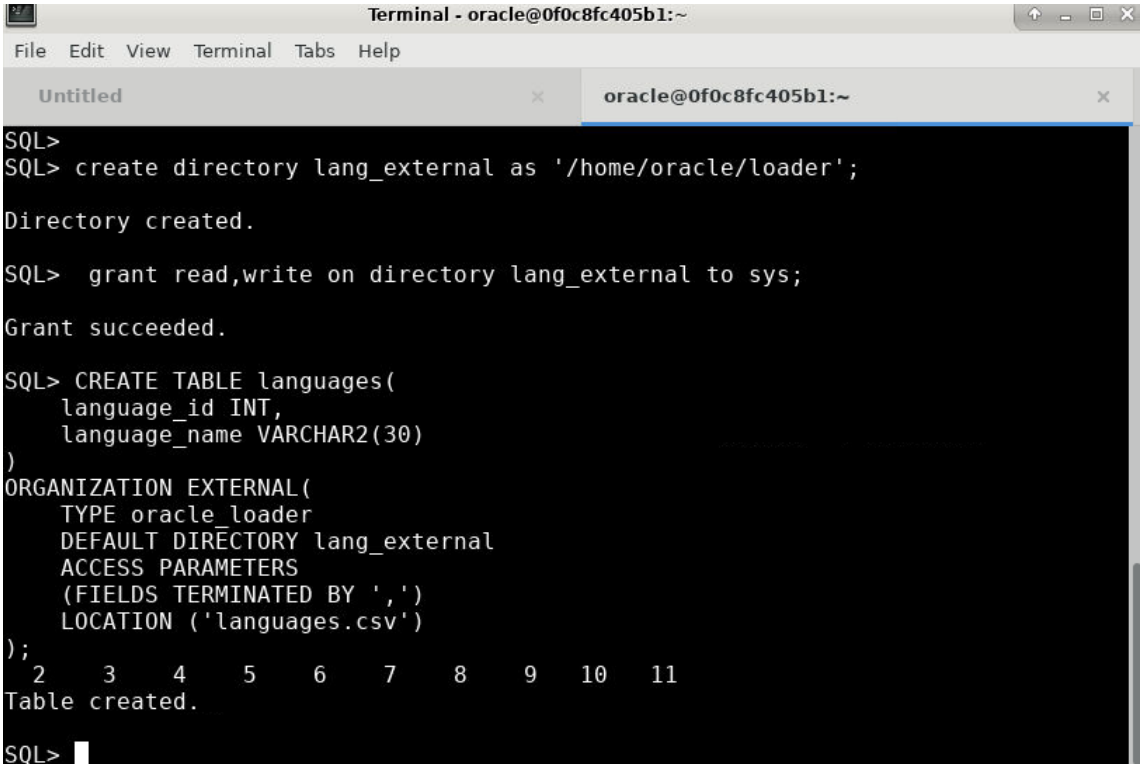
The following statement grant `READ` and `WRITE` privileges to the `SYS` user:

```
SQL> grant read,write on directory lang_external to sys;

Grant succeeded.
```

3) Creating the external table

Use the `CREATE TABLE ORGANIZATION EXTERNAL` statement to create the external table called `languages`:

```
CREATE TABLE languages(
    language_id INT,
    language_name VARCHAR2(30)
)
ORGANIZATION EXTERNAL(
    TYPE oracle_loader
    DEFAULT DIRECTORY lang_external
    ACCESS PARAMETERS
    (FIELDS TERMINATED BY ',')
    LOCATION ('languages.csv')
);
```



When you create the external table using the `CREATE TABLE ORGANIZATION EXTERNAL` statement, you need to specify the following attributes:

`TYPE`

The `TYPE` determines the type of the external table. Oracle provides two types: `ORACLE_LOADER` and `ORACLE_DATADUMP`:

- The `ORACLE_LOADER` access driver is the default that loads data from text data files. Technically speaking, the `ORACLE_LOADER` loads data from an external table to an internal table. However, it cannot unload the data i.e., it cannot move data from the internal table to the external table.
- The `ORACLE_DATAPUMP` access driver can perform both loads and unloads. It requires the data in the binary dump file format.

`DEFAULT DIRECTORY`

The `DEFAULT DIRECTORY` clause allows you to specify the default directory for storing all input and output files. It accepts a directory object, not a directory path.

`ACCESS PARAMETERS`

The `ACCESS PARAMETERS` clause allows you to describe the external data source. Note that each access driver has its own access parameters.

`LOCATION`

The `LOCATION` clause specifies the data files for the external table.

You specify the data file in the form `directory:file`. If you omit the `directory` part, Oracle uses the `DEFAULT DIRECTORY` for the file.

Using an Oracle external table

Once the external table is created, you can [query] it like a normal table:

```
SELECT
    language_id,
    language_name
FROM
    languages
ORDER BY
    language_name;
```

Here is the partial output:

LANGUAGE_ID	LANGUAGE_NAME
1	Acholi
2	Afrikaans
3	Akan
4	Albanian
5	Amharic
6	Arabic
7	Ashante
8	Asl
9	Assyrian
10	Azerbaijani
11	Azeri
12	Bajuni

You can also [create a view] based on the external table:

```
CREATE VIEW language_a
AS
SELECT language_name
FROM languages
WHERE language_name LIKE 'A%';
```

However, you cannot apply the `INSERT`, `DELETE`, and `UPDATE` to the external table:

```
DELETE FROM languages
WHERE language_id = 1;
```

Here is the error message:

```
SQL Error: ORA-30657: operation not supported on external organized table
```

The same error will occur if you attempt to insert a new row into the external table:

```
INSERT INTO languages(language_id, language_name)
VALUES(190,'Alien');
```

```
SQL> DELETE FROM languages
WHERE language_id = 1;  2
DELETE FROM languages
            *
ERROR at line 1:
ORA-30657: operation not supported on external organized table


SQL> INSERT INTO languages(language_id, language_name)
VALUES(190,'Alien');  2
INSERT INTO languages(language_id, language_name)
            *
ERROR at line 1:
ORA-30657: operation not supported on external organized table
```

Oracle external table troubleshooting

If you forget to grant the directory permission to users who access the external table, you will receive the following error:

```
ORA-29913: error in executing ODCIEXTTABLEFETCH callout
ORA-30653: reject limit reached
```

Oracle will issue the following error if you attempt to define a constraint such as `primary key` and `foreign key` constraints on the external table.

```
ORA-30657: operation not supported on external organized table
```

In this lab, you have learned about Oracle external tables and how to use them to access data from flat files as they were in normal tables.