

# MIDS W205

Lab #	7	Lab Title	Working with Relational Databases
Related Module(s)	7	Goal	Get you started on an RDBMS by trying PostGres
Last Updated	10/5/15	Expected duration	40 minutes

## Introduction

While our initial investigations have dealt with Hive and SparkSQL, often as a Data Scientist, you will encounter relational databases like PostgreSQL. In this lab, you'll explore the basics of loading data into Postgres, creating running queries and understanding how those queries are transformed into plans for DAGs. Submit your answers through the LMS as a text file, docx file, or PDF.

## Getting the Data

Navigate to the /data directory on your AWS instance or the \$HOME directory on your Vagrant install. Download the Pagila data as follows:

```
wget -O pagila.zip  
http://pgfoundry.org/frs/download.php/1719/pagila-0.10.1.zip
```

```
unzip pagila.zip
```

Next, we're going to log into postgresql and import the data.

Log into postgres as the postgres user:

```
psql -U postgres
```

Now create the database:

```
create database dvdrental;
```

Connect to the database using \c

```
\c dvdrental
```

Load the data using the \i command. \i runs .sql scripts in Postgres.

```
\i pagila-0.10.1/pagila-schema.sql
\i pagila-0.10.1/pagila-insert-data.sql
\i pagila-data.sql
```

At this point the data is loaded. Examine the database schema using the \dt command.  
Examine the schema of a table using the \d <table name> command

**Question 1: What is the output of \dt?**

**Question 2: What is the schema for the customer table?**

## Running Queries and Understanding EXPLAIN plans

We want to understand not only what queries we can issue against data, but also how that query maps to an execution plan. For each of the following sections, run the queries provided, and generate their explain plans using: EXPLAIN <sql query here>

### Projection and Selection

Run the following simple queries, then generate their explain plans.

Projection

```
SELECT customer_id, first_name, last_name FROM customer;
```

Projection and Selection #1

```
SELECT customer_id,
       amount,
       payment_date
FROM payment
WHERE amount <= 1 OR amount >= 8;
```

Projection and Selection #2

```
SELECT
       customer_id,
       payment_id,
       amount
FROM
       payment
WHERE
```

```
        amount BETWEEN 5
AND 9;
```

**Question 3: What similarities do you see in the explain plans for these 3 queries?**

### **Merging Data: JOINS and UNIONS**

Run the following statements:

Union 2 tables:

```
SELECT u.customer_id, sum(u.amount) from (
  SELECT *
  FROM
    payment_p2007_01
  UNION
  SELECT *
  FROM
    payment_p2007_02
) u
WHERE u.payment_date <= '2007-02-01 00:00:00'::timestamp
without time zone
GROUP BY u.customer_id
;
```

Partitioned Table

```
SELECT customer_id, sum(amount) from
payment
WHERE payment_date <= '2007-02-01 00:00:00'::timestamp
without time zone
GROUP BY customer_id
;
```

**Question 4: What is the difference between the plans for the Partitioned table and the union query? Why do you think this difference exists?**

Join 2 tables

```
SELECT
  customer.customer_id,
```

```
        first_name,  
        last_name,  
        email,  
  
        amount,  
        payment_date  
FROM  
    customer  
    INNER JOIN payment ON payment.customer_id =  
customer.customer_id;
```

**Question 5: What join algorithm is used for the inner join?**

Finally, disconnect from postgres, using \q