PROJECT 3:

Market Analysis in Banking Domain

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SUBMISSION DATE: 26 November, 2020

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CHAPTER 1: PROBLEM STATEMENT

Background and Objective:

Your client, a Portuguese banking institution, ran a marketing campaign to convince potential customers to invest in a bank term deposit scheme.

The marketing campaigns were based on phone calls. Often, the same customer was contacted more than once through phone, in order to assess if they would want to subscribe to the bank term deposit or not. You have to perform the marketing analysis of the data generated by this campaign.

Domain: Banking (Market Analysis)

Dataset Description

The data fields are as follows:

1.	age	numeric
2.	job	type of job (categorical: 'admin.','blue-collar','entrepreneur','housemaid','management','retired','self-employed','services','student','technician','unemployed','unknown')
3.	marital	marital status (categorical: 'divorced', 'married', 'single', 'unknown'; note: 'divorced' means divorced or widowed)
4.	education	(categorical: 'basic.4y','basic.6y','basic.9y','high.school','illiterate','professional.course',' university.degree','unknown')
5.	default	has credit in default? (categorical: 'no', 'yes', 'unknown')
6.	housing:	has housing loan? (categorical: 'no', 'yes', 'unknown')
7.	loan	has a personal loan? (categorical: 'no', 'yes', 'unknown')

related to the last contact of the current campaign:

8.	contact	contact communication type (categorical: 'cellular', 'telephone')
9.	month	Month of last contact (categorical: 'jan', 'feb', 'mar', ..., 'nov', 'dec')

10.	day_of_week	last contact day of the week (categorical: 'mon','tue','wed','thu','fri')
11.	duration	last contact duration, in seconds (numeric). Important note: this attribute highly affects the output target (example, if duration=0 then y='no'). Yet, the duration is not known before a call is performed. Also, after the end of the call “y” is obviously known. Thus, this input should only be included for benchmark purposes and should be discarded if the intention is to have a realistic predictive model.

other attributes:

12.	campaign	number of times a customer was contacted during the campaign (numeric, includes last contact)
13.	pdays:	number of days passed after the customer was last contacted from a previous campaign (numeric; 999 means customer was not previously contacted)
14.	previous	number of times the customer was contacted prior to (or before) this campaign (numeric)
15.	poutcome	outcome of the previous marketing campaign (categorical: 'failure', 'nonexistent', 'success')

#Output variable (desired target):

16	y	has the customer subscribed a term deposit? (binary: 'yes', 'no')

Analysis tasks to be done-:

The data size is huge and the marketing team has asked you to perform the below analysis-

1. Load data and create a Spark data frame
2. Give marketing success rate (No. of people subscribed / total no. of entries).
    - Give marketing failure rate
3. Give the maximum, mean, and minimum age of the average targeted customer
4. Check the quality of customers by checking average balance, median balance of customers
5. Check if age matters in marketing subscription for deposit
6. Check if marital status mattered for a subscription to deposit
7. Check if age and marital status together mattered for a subscription to deposit scheme
8. Do feature engineering for the bank and find the right age effect on the campaign.

CHAPTER 2: WRITEUP

The project is related to the marketing analysis of the Portuguese Banking Institution. The goal of the project is to perform the analysis of the data generated by the marketing campaign.

The banking institution ran a marketing campaign to convince potential customers to invest in a bank term deposit scheme.

The marketing campaigns were based on phone calls. Often, the same customer was contacted more than once through phone, in order to assess if they would want to subscribe to the bank term deposit or not.

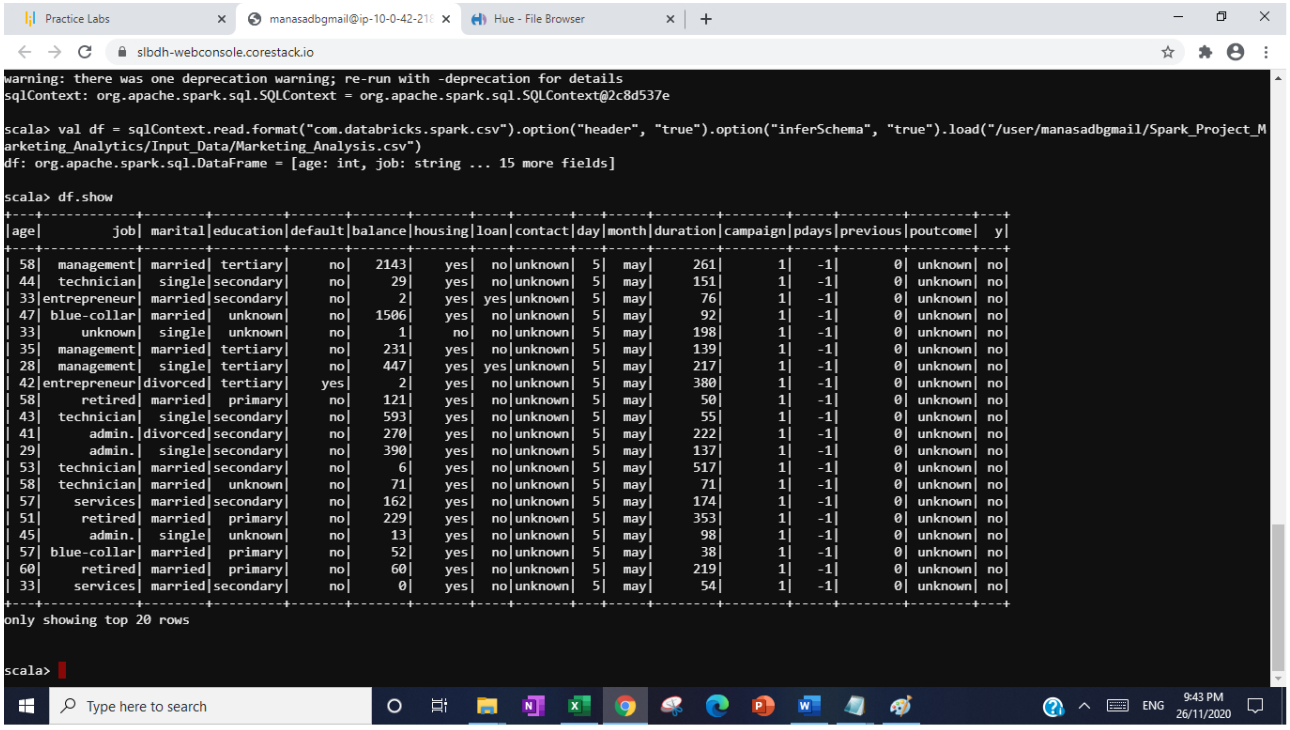
The project uses Scala as a programming language, Hive as a data storage unit and Spark SQL functions to achieve the results.

CHAPTER 3: SOURCE CODE WITH OUTPUT

Task 1: Load data and create a Spark data frame.

```
scala> import org.apache.spark.sql.SQLContext

scala> val sqlContext = new SQLContext(sc)

scala> val df = sqlContext.read.format("com.databricks.spark.csv").option("header", "true").option("inferSchema","true").load("/user/manasadbgmail/Spark_Project_Marketing_Analytics/Input_Data/Marketing_Analysis.csv")

scala> df.show
```

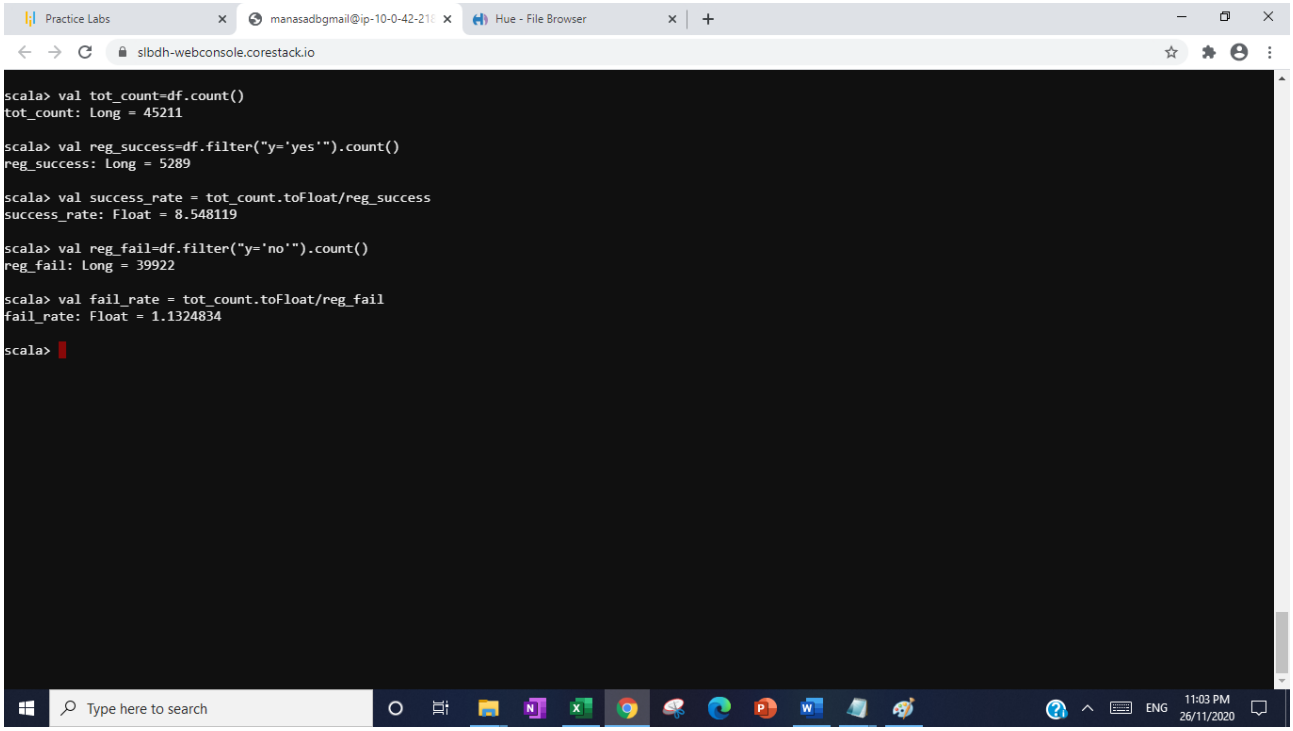
Output 1:



Task 2: Give marketing success rate.(No. of people subscribed / total no. of entries)
Give marketing failure rate.

```
scala> val tot_count=df.count()

scala> val reg_success=df.filter("y='yes'").count()

scala> val success_rate = tot_count.toFloat/reg_success

scala> val reg_fail=df.filter("y='no'").count()

scala> val fail_rate = tot_count.toFloat/reg_fail
```

Output 2:



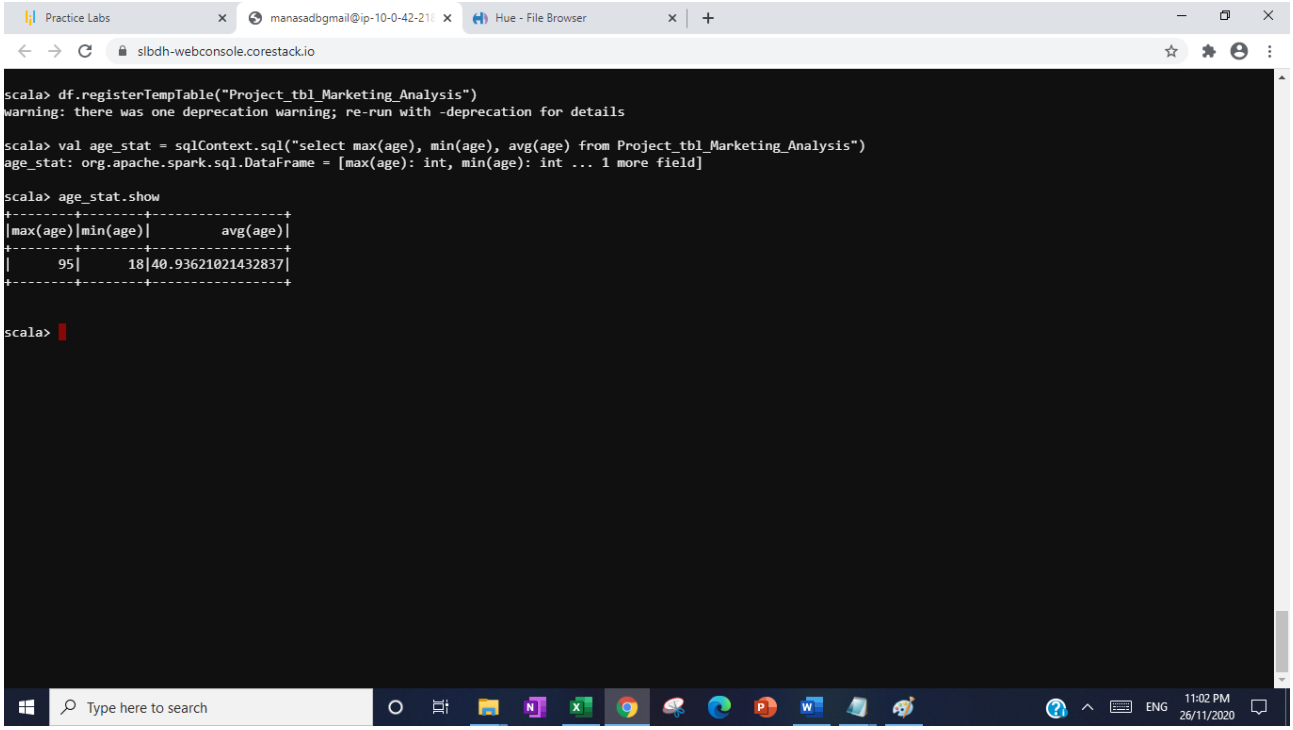
Task 3: Give the maximum, mean, and minimum age of the average targeted customer.

scala> df.registerTempTable("Project_tbl_Marketing_Analysis")

scala> val age_stat = sqlContext.sql("select max(age), min(age), avg(age) from Project_tbl_Marketing_Analysis")

scala> age_stat.show()

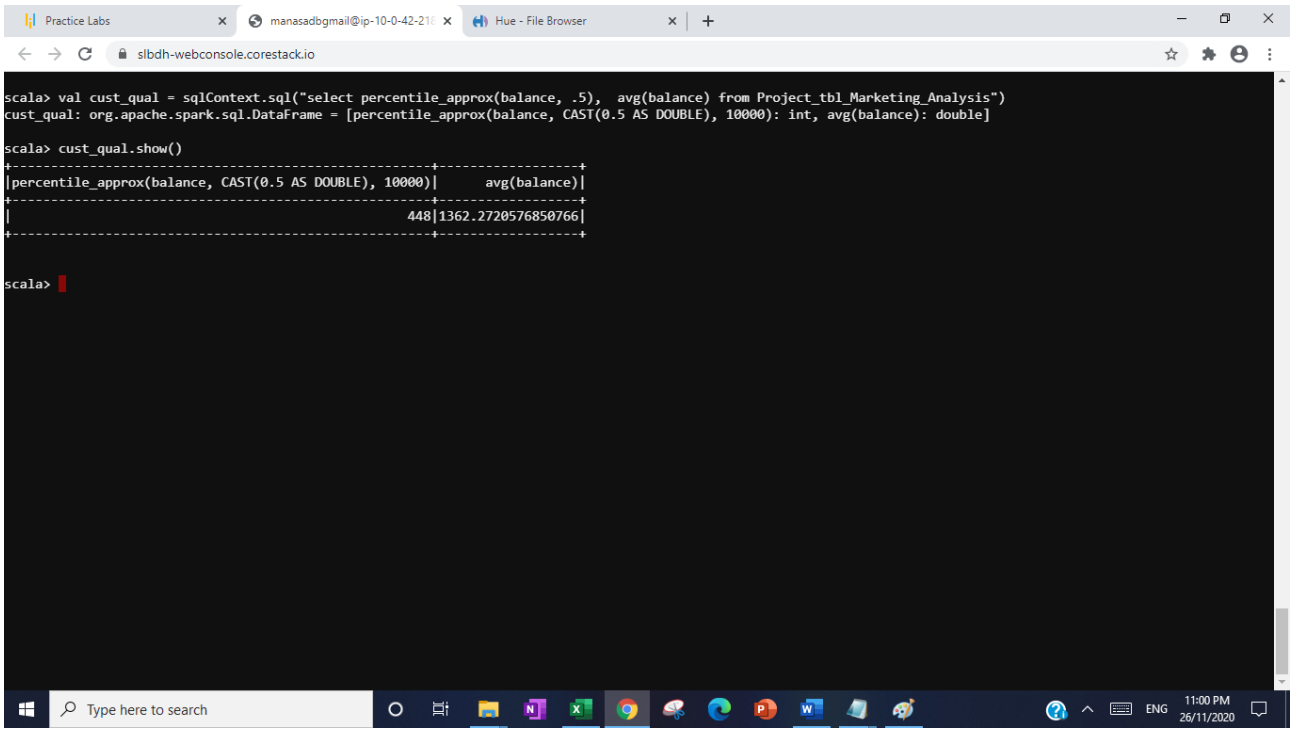
Output 3:



Task 4: Check the quality of customers by checking average balance, median balance of customers.

```
scala> val cust_qual = sqlContext.sql("select percentile_approx(balance, .5),  avg(balance) from Project_tbl_Marketing_Analysis")

scala> cust_qual.show()
```

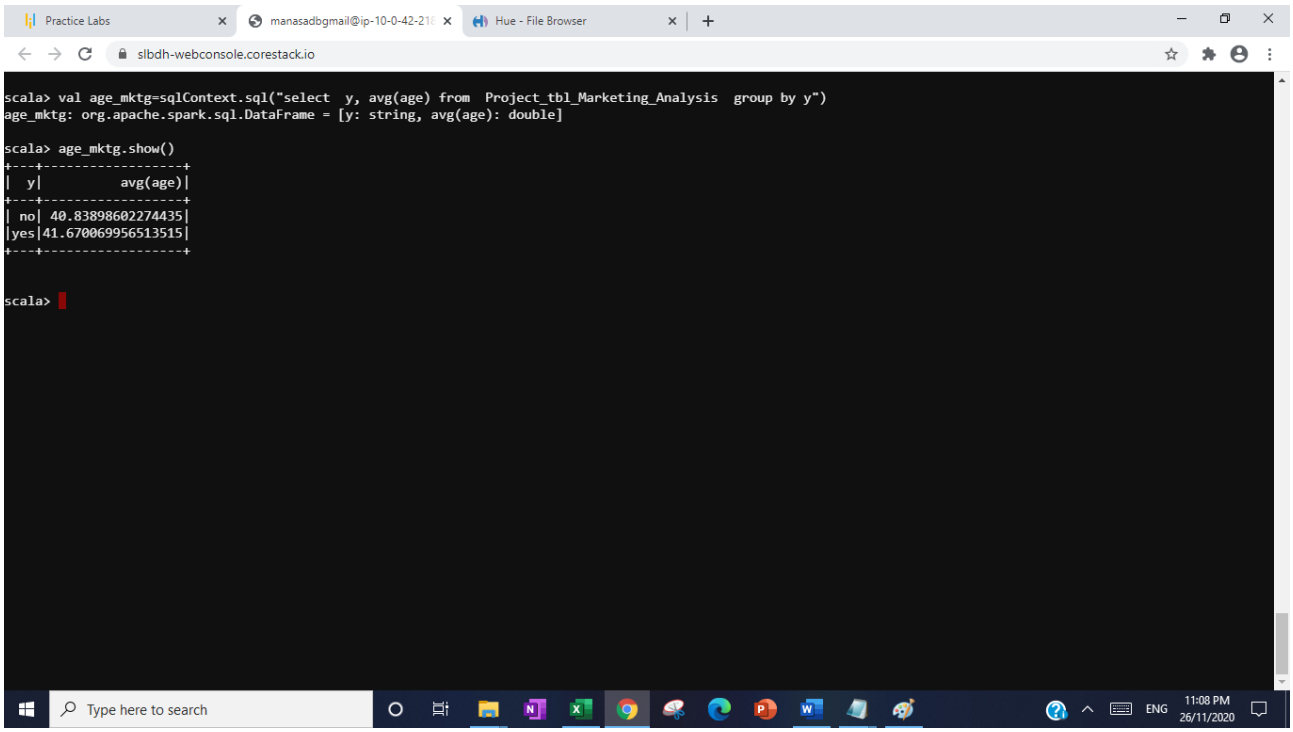
Output 4:



Task 5: Check if age matters in marketing subscription for deposit

```
scala> val age_mktg=sqlContext.sql("select  y, avg(age) from
Project_tbl_Marketing_Analysis  group by y")

scala> age_mktg.show()
```

Output 5:

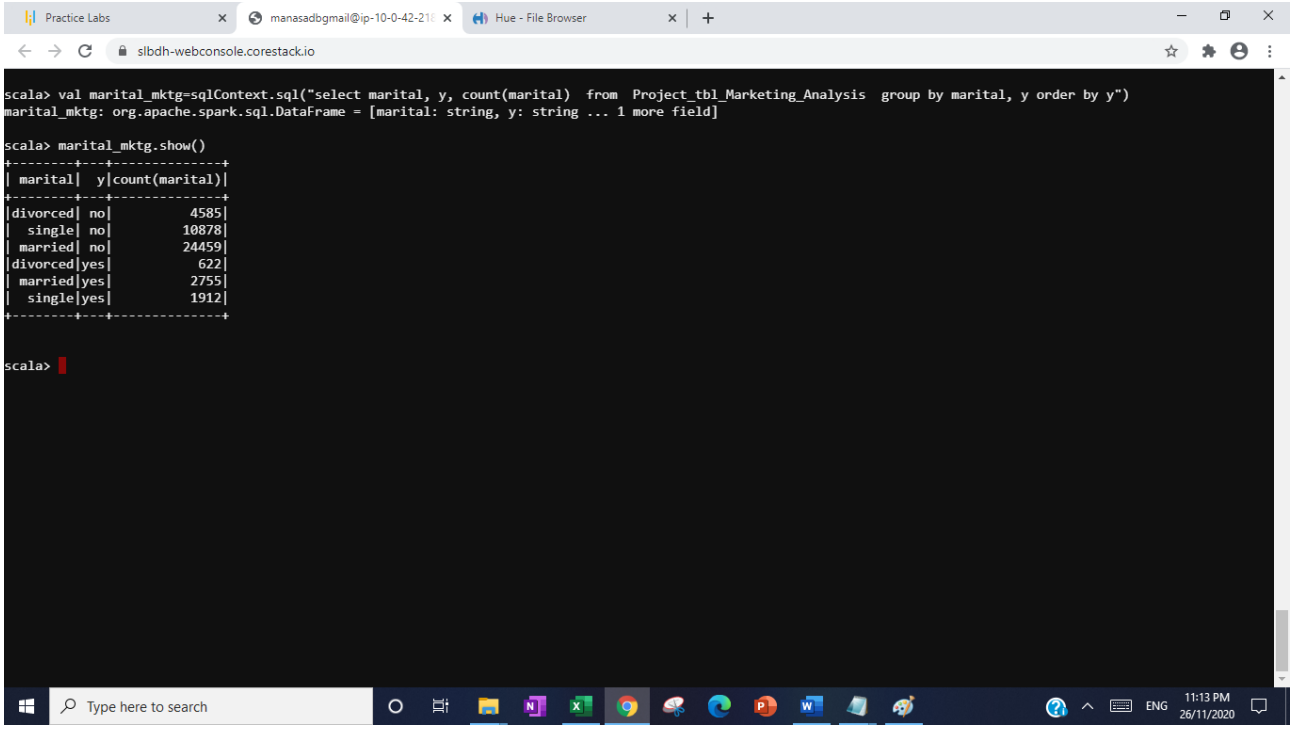


Task 6: Check if marital status mattered for a subscription to deposit

scala> val marital_mktg=sqlContext.sql("select marital, y, count(marital) from Project_tbl_Marketing_Analysis group by marital, y order by y")

scala> marital_mktg.show()

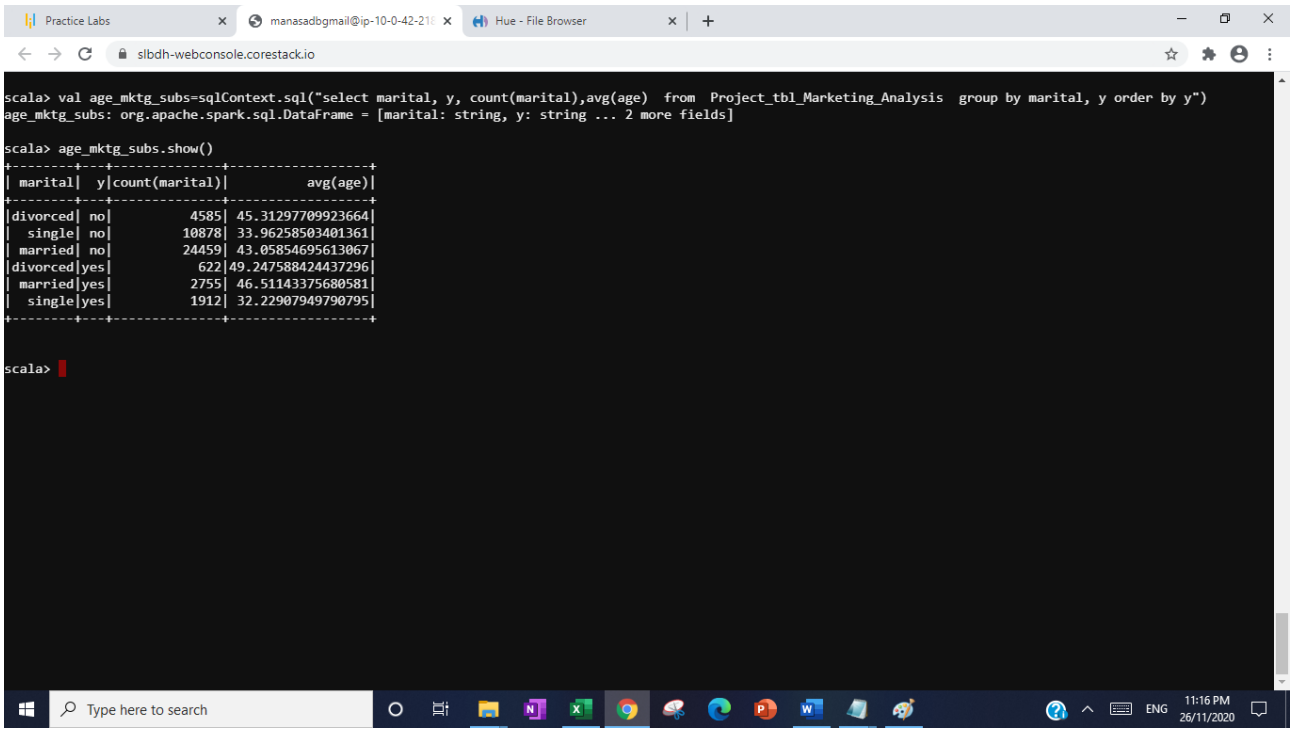
Output 6:



Task 7: Check if age and marital status together mattered for a subscription to deposit scheme.

```
scala> val age_mktg_subs=sqlContext.sql("select marital, y, count(marital),avg(age)  from Project_tbl_Marketing_Analysis  group by marital, y order by y")

scala> age_mktg_subs.show()
```

Output 7:



Task 8: Do feature engineering for the bank and find the right age effect on the campaign.

scala> val age_camp = sqlContext.sql("select y, age, count(y) from Project_tbl_Marketing_Analysis group by y, age order by y, age")

scala> age_camp.show()

Output 8: