```
import os
# Find the latest version of spark 3.0 from http://www.apache.org/dist/spark/ and enter as the spark version
# For example:
# spark_version = 'spark-3.0.3'
spark_version = 'spark-3.0.3'
os.environ['SPARK_VERSION']=spark_version

# Install Spark and Java
!apt-get update
!apt-get install openjdk-11-jdk-headless -qq > /dev/null
!wget -q http://www.apache.org/dist/spark/$SPARK_VERSION/$SPARK_VERSION-bin-hadoop2.7.tgz
!tar xf $SPARK_VERSION-bin-hadoop2.7.tgz
!pip install -q findspark

# Set Environment Variables
import os
os.environ["JAVA_HOME"] = "/usr/lib/jvm/java-11-openjdk-amd64"
os.environ["SPARK_HOME"] = f"/content/{spark_version}-bin-hadoop2.7"

# Start a SparkSession
import findspark
findspark.init()
```

```
    Hit:1 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  InRelease
    Hit:2 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ InRelease
    Ign:3 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  InRelease
    Hit:4 http://archive.ubuntu.com/ubuntu bionic InRelease
    Hit:5 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  Release
    Hit:6 http://archive.ubuntu.com/ubuntu bionic-updates InRelease
    Hit:7 http://archive.ubuntu.com/ubuntu bionic-backports InRelease
    Hit:8 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic InRelease
    Hit:9 http://security.ubuntu.com/ubuntu bionic-security InRelease
    Hit:10 http://ppa.launchpad.net/cran/libgit2/ubuntu bionic InRelease
    Hit:11 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu bionic InRelease
    Hit:12 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic InRelease
    Reading package lists... Done
```

```
import os
```

```
# Find the latest version of spark 3.0  from http://www.apache.org/dist/spark/ and enter as the spark version
# For example:
# spark_version = 'spark-3.0.3'
spark_version = 'spark-3.2.1'
os.environ['SPARK_VERSION']=spark_version

# Install Spark and Java
!apt-get update
!apt-get install openjdk-11-jdk-headless -qq > /dev/null
!wget -q http://www.apache.org/dist/spark/$SPARK_VERSION/$SPARK_VERSION-bin-hadoop2.7.tgz
!tar xf $SPARK_VERSION-bin-hadoop2.7.tgz
!pip install -q findspark

# Set Environment Variables
import os
os.environ["JAVA_HOME"] = "/usr/lib/jvm/java-11-openjdk-amd64"
os.environ["SPARK_HOME"] = f"/content/{spark_version}-bin-hadoop2.7"

# Start a SparkSession
import findspark
findspark.init()
```

```
    Hit:1 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ InRelease
    Hit:2 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  InRelease
    Hit:3 http://security.ubuntu.com/ubuntu bionic-security InRelease
    Hit:4 http://archive.ubuntu.com/ubuntu bionic InRelease
    Ign:5 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  InRelease
    Hit:6 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  Release
    Hit:7 http://archive.ubuntu.com/ubuntu bionic-updates InRelease
    Hit:8 http://archive.ubuntu.com/ubuntu bionic-backports InRelease
    Hit:9 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic InRelease
    Hit:10 http://ppa.launchpad.net/cran/libgit2/ubuntu bionic InRelease
    Hit:11 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu bionic InRelease
    Hit:12 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic InRelease
    Reading package lists... Done
```

```
# Download the Postgres driver that will allow Spark to interact with Postgres.
!wget https://jdbc.postgresql.org/download/postgresql-42.2.16.jar
```

```
--2022-05-28 19:53:44--  https://jdbc.postgresql.org/download/postgresql-42.2.16.jar
Resolving jdbc.postgresql.org (jdbc.postgresql.org)... 72.32.157.228, 2001:4800:3e1:1::228
Connecting to jdbc.postgresql.org (jdbc.postgresql.org)|72.32.157.228|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1002883 (979K) [application/java-archive]
Saving to: ‘postgresql-42.2.16.jar.1’

postgresql-42.2.16. 100%[===================>] 979.38K  4.96MB/s    in 0.2s

2022-05-28 19:53:45 (4.96 MB/s) - ‘postgresql-42.2.16.jar.1’ saved [1002883/1002883]
```

```
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("M16-Amazon-Challenge").config("spark.driver.extraClassPath","/content/postgr
```

Load Amazon Data into Spark DataFrame

```
from pyspark import SparkFiles
url = "https://s3.amazonaws.com/amazon-reviews-pds/tsv/amazon_reviews_us_Furniture_v1_00.tsv.gz"
spark.sparkContext.addFile(url)
df = spark.read.option("encoding", "UTF-8").csv(SparkFiles.get("amazon_reviews_us_Furniture_v1_00.tsv.gz"), sep="\
df.show()
```

```
+-----------+-----------+--------------+----------+--------------+--------------------+----------------+-----
|marketplace|customer_id|     review_id|product_id|product_parent|       product_title|product_category|star_
+-----------+-----------+--------------+----------+--------------+--------------------+----------------+-----
|         US|   24509695|R3VR960AHLFKDV|B004HB5E0E|     488241329|Shoal Creek Compu...|       Furniture|
|         US|   34731776|R16LGVMFKIUT0G|B0042TNMMS|     205864445|Dorel Home Produc...|       Furniture|
|         US|    1272331|R1AIMEEPYHMOE4|B0030MPBZ4|     124663823|Bathroom Vanity T...|       Furniture|
|         US|   45284262|R1892CCSZWZ9SR|B005G02ESA|     382367578|Sleep Master Ulti...|       Furniture|
|         US|   30003523|R285P679YWVKD1|B005JS8AUA|     309497463|1 1/4" GashGuards...|       Furniture|
|         US|   18311821| RLB33HJBXHZHU|B00AVUQQGQ|     574537906|Serta Bonded Leat...|       Furniture|
|         US|   42943632|R1VGTZ94DBAD6A|B00CFY20GQ|     407473883|Prepac Shoe Stora...|       Furniture|
|         US|   43157304|R168KF82ICSOHD|B00FKC48QA|     435120460|HomCom PU Leather...|       Furniture|
|         US|   51918480|R20DIYIJ0OCMOG|B00N9IAL9K|     356495985|   Folding Step Stool|       Furniture|
|         US|   14522766| RD46RNVOHNZSC|B001T4XU1C|     243050228|Ace Bayou Adult V...|       Furniture|
|         US|   43054112|R2JDOCETTM3AXS|B002HRFLBC|      93574483|4D Concepts Audio...|       Furniture|
|         US|   26622950|R33YMW36IDZ6LE|B006MISZOC|     941823468|Zinus SC-SBBK-14N...|       Furniture|
|         US|   17988940|R30ZGGUHZ04C1S|B008BMGABC|     460567746|Poundex Marble Di...|       Furniture|
|         US|   18444952| RS2EZU76IK2BT|B00CO2VH5Y|     829613894|Safavieh Lyndhurs...|       Furniture|
|         US|   16937084|R1GJC1BP028XO9|B00LI4RJQ0|     816478187|Sauder Boone Moun...|       Furniture|
|         US|   23665632|R2VKJPGXXEK5GP|B0046EC1D0|     358594389|Winsome Wood Brea...|       Furniture|
|         US|    4110125|R17KS83G3KLT97|B00DQQPL36|     312571325|HODEDAH IMPORT Me...|       Furniture|
|         US|     107621|R3PQL8SR4NEHWL|B003X7RWB2|     402665054|Flash Furniture H...|       Furniture|
|         US|    2415090|R2F5WW7WNO5RRG|B001TJYPJ8|     854989315|Sleep Revolution ...|       Furniture|
|         US|   48285966|R3UDJKVWQCFIC9|B000TMHX9A|     814079288|Flash Furniture V...|       Furniture|
+-----------+-----------+--------------+----------+--------------+--------------------+----------------+-----
only showing top 20 rows
```

Create DataFrames to match tables

```
from pyspark.sql.functions import to_date
# Read in the Review dataset as a DataFrame
# dateframe is already created.


# Create the customers_table DataFrame
customers_df = df.groupby("customer_id").agg({"customer_id":"count"}).withColumnRenamed("count(customer_id)", "cus
customers_df.show()
```

```
+-----------+--------------+
|customer_id|customer_count|
+-----------+--------------+
|   17067926|             2|
|   10714827|             1|
|   42560427|             1|
|   30717305|             1|
|    1178966|             1|
|   10429047|             1|
|   41351814|             1|
|   52541790|             2|
|   52512151|             1|
|   37534120|             1|
|   22555935|             1|
|   18681995|             1|
|    2119235|             2|
|   21846356|             1|
|   42251639|             1|
|    7730812|             1|
|   37666248|             1|
|   43676452|             1|
|   41466760|             1|
|   30403003|             1|
+-----------+--------------+
only showing top 20 rows
```

```
# Create the products_table DataFrame and drop duplicates.
products_df = df.select(['product_id','product_title']).drop_duplicates()
products_df.show()
```

```
+----------+--------------------+
|product_id|       product_title|
+----------+--------------------+
|B0049H81OM|Fun Rugs Surf Tim...|
|B001U0UOO6|Furniture Repair Set|
|B0076I51JE|Traditional Opera...|
|B007OWPBGU|Frenchi Home Furn...|
|B00DHWGB4M|Circle Design Sid...|
|B00RI6TNJ8|Abrahami Hariz Bu...|
|B00GHZA29Q|nuLOOM Varanas Co...|
|B00GSIIGQS|Milton Greens Sta...|
|B00VZ4RY1I|Dean Shifting San...|
|B007QUM5DM| Charles Petite Sofa|
|B00MN6NTDO|Safavieh Adironda...|
|B00BK31LDQ|Glass Computer De...|
|B0091SXURW|Altra Parsons Des...|
|B00TBVK0Y0|Best Price Mattre...|
|B00A2XM5QC|Legacy Decor Shoj...|
|B002KE7HTQ|Home Styles 5001-...|
|B00V3LVD2O|Roundhill Furnitu...|
|B00PN9YSAG|Baxton Studio Hir...|
|B005VAFFN6|Duro Hanley Silve...|
|B001BX1JSC|Flash Furniture V...|
+----------+--------------------+
    only showing top 20 rows
```

```
# Create the review_id_table DataFrame.
# Convert the 'review_date' column to a date datatype with to_date("review_date", 'yyyy-MM-dd').alias("review_date
review_id_df = df.select(['review_id', 'customer_id' , 'product_id', 'product_parent', to_date("review_date", 'yyy
review_id_df.show()
```

```
    +--------------+-----------+----------+--------------+-----------+
    |     review_id|customer_id|product_id|product_parent|review_date|
    +--------------+-----------+----------+--------------+-----------+
    |R3VR960AHLFKDV|   24509695|B004HB5E0E|     488241329| 2015-08-31|
    |R16LGVMFKIUT0G|   34731776|B0042TNMMS|     205864445| 2015-08-31|
    |R1AIMEEPYHMOE4|    1272331|B0030MPBZ4|     124663823| 2015-08-31|
    |R1892CCSZWZ9SR|   45284262|B005G02ESA|     382367578| 2015-08-31|
    |R285P679YWVKD1|   30003523|B005JS8AUA|     309497463| 2015-08-31|
    | RLB33HJBXHZHU|   18311821|B00AVUQQGQ|     574537906| 2015-08-31|
    |R1VGTZ94DBAD6A|   42943632|B00CFY20GQ|     407473883| 2015-08-31|
    |R168KF82ICSOHD|   43157304|B00FKC48QA|     435120460| 2015-08-31|
    |R20DIYIJ0OCMOG|   51918480|B00N9IAL9K|     356495985| 2015-08-31|
    | RD46RNVOHNZSC|   14522766|B001T4XU1C|     243050228| 2015-08-31|
    |R2JDOCETTM3AXS|   43054112|B002HRFLBC|      93574483| 2015-08-31|
    |R33YMW36IDZ6LE|   26622950|B006MISZOC|     941823468| 2015-08-31|
    |R30ZGGUHZ04C1S|   17988940|B008BMGABC|     460567746| 2015-08-31|
    | RS2EZU76IK2BT|   18444952|B00CO2VH5Y|     829613894| 2015-08-31|
    |R1GJC1BP028XO9|   16937084|B00LI4RJQ0|     816478187| 2015-08-31|
    |R2VKJPGXXEK5GP|   23665632|B0046EC1D0|     358594389| 2015-08-31|
    |R17KS83G3KLT97|    4110125|B00DQQPL36|     312571325| 2015-08-31|
    |R3PQL8SR4NEHWL|     107621|B003X7RWB2|     402665054| 2015-08-31|
    |R2F5WW7WNO5RRG|    2415090|B001TJYPJ8|     854989315| 2015-08-31|
    |R3UDJKVWQCFIC9|   48285966|B000TMHX9A|     814079288| 2015-08-31|
    +--------------+-----------+----------+--------------+-----------+
    only showing top 20 rows
```

```
# Create the vine_table. DataFrame
vine_df = df.select(['review_id', 'star_rating', 'helpful_votes', 'total_votes', 'vine', 'verified_purchase'])
vine_df.show()
```

```
+--------------+-----------+-------------+-----------+----+-----------------+
|     review_id|star_rating|helpful_votes|total_votes|vine|verified_purchase|
+--------------+-----------+-------------+-----------+----+-----------------+
|R3VR960AHLFKDV|          4|            0|          0|   N|                Y|
|R16LGVMFKIUT0G|          5|            0|          0|   N|                Y|
|R1AIMEEPYHMOE4|          5|            1|          1|   N|                Y|
|R1892CCSZWZ9SR|          3|            0|          0|   N|                Y|
|R285P679YWVKD1|          3|            0|          0|   N|                N|
| RLB33HJBXHZHU|          5|            0|          0|   N|                Y|
|R1VGTZ94DBAD6A|          5|            2|          2|   N|                Y|
|R168KF82ICSOHD|          5|            0|          0|   N|                Y|
|R20DIYIJ0OCMOG|          5|            0|          0|   N|                Y|
| RD46RNVOHNZSC|          5|            0|          0|   N|                Y|
|R2JDOCETTM3AXS|          5|            0|          0|   N|                Y|
|R33YMW36IDZ6LE|          5|            0|          0|   N|                Y|
|R30ZGGUHZ04C1S|          5|            1|          1|   N|                Y|
| RS2EZU76IK2BT|          5|            0|          0|   N|                Y|
|R1GJC1BP028XO9|          5|            2|          3|   N|                Y|
|R2VKJPGXXEK5GP|          1|            0|          0|   N|                Y|
|R17KS83G3KLT97|          3|            0|          0|   N|                Y|
|R3PQL8SR4NEHWL|          4|            0|          0|   N|                Y|
|R2F5WW7WNO5RRG|          5|            0|          0|   N|                Y|
|R3UDJKVWQCFIC9|          5|            0|          0|   N|                Y|
+--------------+-----------+-------------+-----------+----+-----------------+
only showing top 20 rows
```

Connect to the AWS RDS instance and write each DataFrame to its table.

```
# Configure settings for RDS
mode = "append"
jdbc_url="jdbc:postgresql://challenge16.cnx1rydbieto.us-east-1.rds.amazonaws.com:5432/challenge16"
config = {"user":"root",
          "password": "Sillybilly1956",
          "driver":"org.postgresql.Driver"}
```

```
# Write review_id_df to table in RDS
review_id_df.write.jdbc(url=jdbc_url, table='review_id_table', mode=mode, properties=config)
```

```
# Write products_df to table in RDS
# about 3 min
products_df.write.jdbc(url=jdbc_url, table='products_table', mode=mode, properties=config)


# Write customers_df to table in RDS
# 5 min 14 s
customers_df.write.jdbc(url=jdbc_url, table='customers_table', mode=mode, properties=config)


# Write vine_df to table in RDS
# 11 minutes
vine_df.write.jdbc(url=jdbc_url, table='vine_table', mode=mode, properties=config)
```

✓ 3m 42s completed at 2:23 PM ● ×