Week 6 (24 Sep - 30 Sep) Week 7 (1 Oct - 7 Oct)

Project: Building an ETL Pipeline to Transform Data in Data Lake (From Landing Zone to Cleaned Zone)
สามารถเริ่มต้นจากโค้ดที่ https://github.com/zkan/swu-ds525 **ได้**
ในโปรเจคนี้เราจะใช้ข้อมูล GitHub event data **จาก** API **หรือสามารถดาวน์โหลดไฟล์** JSON **ได้ที่** URL **นี้**
สิ่งที่คาดหวังในโปรเจคนี้
ในโปรเจคนี้เราจะตั้งต้นว่าเรามีไฟล์อยู่บน S3 **อยู่แล้ว ดังนั้นทุกคนสามารถที่จะอัพโหลดไฟล์ขึ้นไปไว้บน** S3 **ได้เลย**

1. **มีโค้ดที่ใช้** Spark **ทำ** ETL **จากข้อมูล** JSON **ใน** S3 **ที่** landing zone **และไปสร้างไฟล์ที่** clean **แล้วใน** cleaned zone **ใน** data lake (S3)
2. **มีการเขียน** documentation **อธิบายสิ่งที่ตัวเองทำลงไป**
3. **มี** instruction **ในการรันโค้ดของตัวเอง**

หนังสือภาษาไทย Spark Internal
Click https://github.com/aorjoa/SparkInternals/tree/thai/markdown/thai link to open resource.

Spark By Examples | Learn Spark Tutorial with Examples
Click https://sparkbyexamples.com/ link to open resource.

Introduction to PySpark
Click https://www.datacamp.com/courses/introduction-to-pyspark link to open resource.

Data Wrangling with Spark
Click https://github.com/zkan/data-wrangling-with-spark link to open resource.

Machine Learning with Spark and Zeppelin
Click https://github.com/zkan/machine-learning-with-spark-and-zeppelin link to open resource.

Read Nested JSON in Spark DataFrame
Click https://bigdataprogrammers.com/read-nested-json-in-spark-dataframe/ link to open resource.

How to parse nested JSON objects in spark sql?
Click
https://stackoverflow.com/questions/29948789/how-to-parse-nested-json-objects-in-spark-sql

Slides: Week 7
https://docs.google.com/presentation/d/1gZOfJJ9TzDLQ5ZRAdTLd74ePKzeCSBFVSJsMt7LRx6M/edit?usp=sharing

Week 6 (Part 1)
https://youtu.be/mWkGUzsarAQ

Week 6 (Part 2)
https://youtu.be/sesxWvbJnzo

Week 6 Project Walkthru
https://youtu.be/1sVj7mwAmTE

```
spark.sql("""
    select
        upc
        , product_size
        , split(product_size, ' ')[0] as value
        , split(product_size, ' ')[1] as unit
        , case
            when split(product_size, ' ')[1] = 'OZ' then split(product_size, ' ')[0] * 100
            else
                split(product_size, ' ')[0] / 100
            end as is_oz
```

Week 7
https://youtu.be/c1RtJhyIo9s

Week 7 Office Hour
https://youtu.be/ZIEPt0OI_w0

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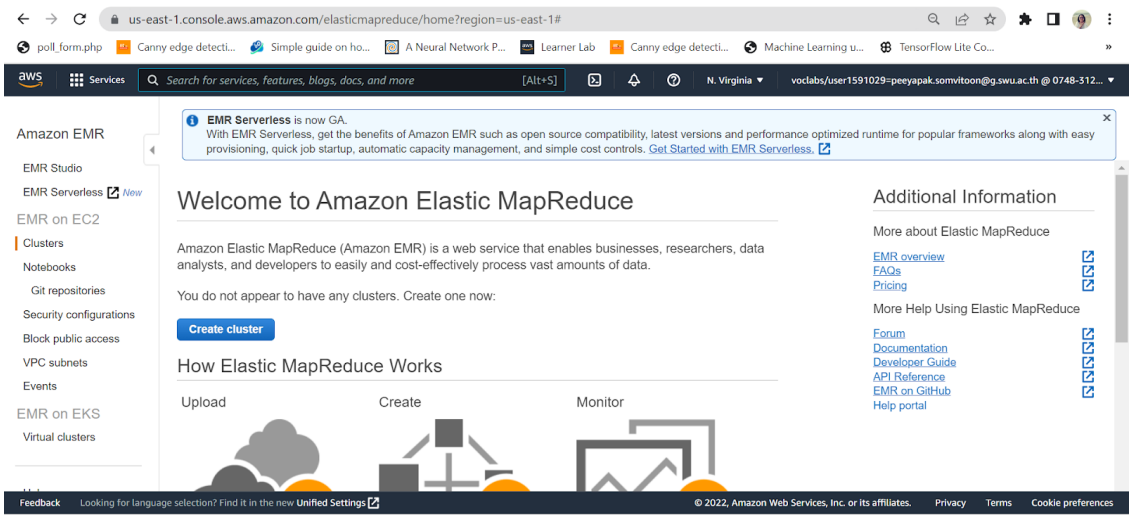
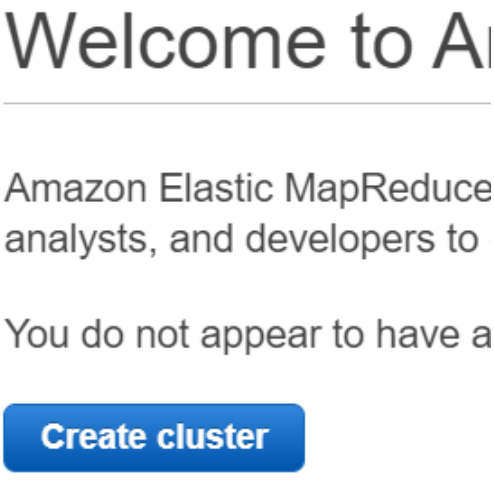
Week 6 (24 Sep - 30 Sep)

```
ddd_v1_w_foQ_1383611@runweb62413:~$ cat ~/.aws/credentials
[default]
aws_access_key_id = ASIARC3CKZR2WNZXQLZA
aws_secret_access_key = puIUVfojgB6Ws4jyyv/AeCjBP1OkqBOW8feUsn7T
aws_session_token = FwoGZXIvYXdzECMaDLfAeXU6AITLcZujViLPAYzC1NjTEmC2LtjXgOmEn7nXiv6AUMyTfx5N64EU
uIojFl5QZ6lMwDMeJJY4vYQpL0ATv5NaZdOo0BOc+vT2qdtL5eYsLxPjWJvw2moTv3He4SKfZagR2T/p43M+3igpVH3L6/1l
TledcIgTqh8A5brrWrg1GJ+eLvLjPpeUBQ4/vdJo+deai69aTM8gNkbg5YCirrzM56kUkCXYUlcw///xklpxZEe3lc89X1kr
ulYlLCpO5WClK0a1OrqPbq5Gcp0fBfxyfORmoyjbmWBIHyi5p7uZBjItbx/VWvVL9mCXoR3+lw3nxGUaoYBM3gNeUNHKFE0X
g/a6Wkvld6Ym4Lm1MN9W
ddd_v1_w_foQ_1383611@runweb62413:~$
```





Create Cluster - Quick Options

Go to advanced options

General Configuration

Cluster name: My cluster

Logging

S3 folder: s3://aws-logs-074831285365-us-east-1/elasticmap

Launch mode: Cluster Step execution

Software configuration

Release: emr-6.7.0

Applications:
- Core Hadoop: Hadoop 3.2.1 with Hive 3.1.3, Hue 4.10.0, Pig 0.17.0 and Tez 0.9.2
- HBase: HBase 2.4.4 with Hadoop 3.2.1, Hive 3.1.3, Hue 4.10.0, Phoenix 5.1.2, and ZooKeeper 3.5.7

Create Cluster - Advanced Options

Go to quick options

- Step 1: Software and Steps
- Step 2: Hardware
- Step 3: General Cluster Settings
- Step 4: Security

Software Configuration

Release: emr-6.7.0

Hadoop 3.2.1	Zeppelin 0.10.0	Livy 0.7.1
JupyterHub 1.4.1	Tez 0.9.2	Flink 1.14.2
Ganglia 3.7.2	HBase 2.4.4	Pig 0.17.0
Hive 3.1.3	Presto 0.272	ZooKeeper 3.5.7
JupyterEnterpriseGateway 2.1.0	MXNet 1.8.0	Sqoop 1.4.7
Hue 4.10.0	Phoenix 5.1.2	Trino 378
Oozie 5.2.1	Spark 3.2.1	HCatalog 3.1.3
TensorFlow 2.4.1		

Multiple master nodes (optional)

Software Configuration

Release: emr-6.7.0

Hadoop 3.2.1	Zeppelin 0.10.0	Livy 0.7.1
JupyterHub 1.4.1	Tez 0.9.2	Flink 1.14.2
Ganglia 3.7.2	HBase 2.4.4	Pig 0.17.0
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JupyterEnterpriseGateway 2.1.0	MXNet 1.8.0	Sqoop 1.4.7
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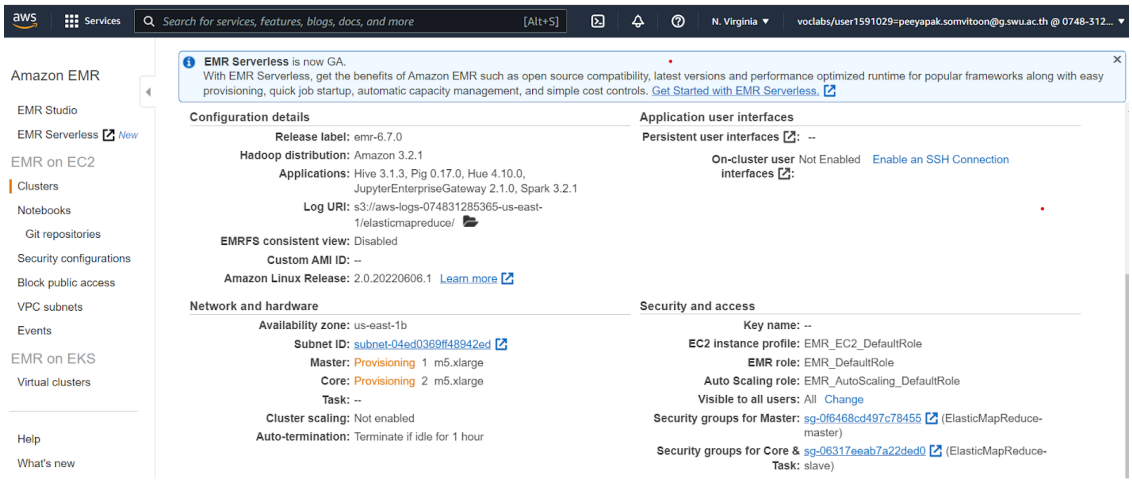
Oozie 5.2.1	Spark 3.2.1	HCatalog 3.1.3
TensorFlow 2.4.1		


Services
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N. Virginia
voclabs/user1591029=peeyapak.somvitoon@g.swu.ac.th @ 0748-312...
Amazon EMR
EMR Studio
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EMR on EC2
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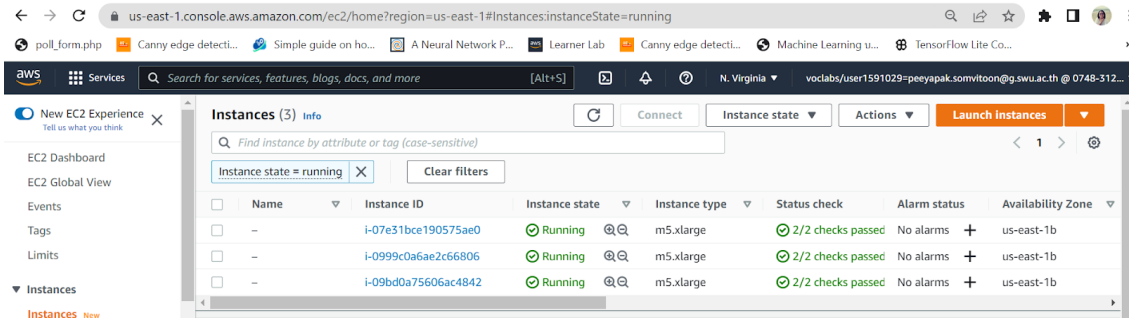
With EMR Serverless, get the benefits of Amazon EMR such as open source compatibility, latest versions and performance optimized runtime for popular frameworks along with easy provisioning, quick job startup, automatic capacity management, and simple cost controls. Get Started with EMR Serverless.
Configuration details
Release label: emr-6.7.0
Hadoop distribution: Amazon 3.2.1
Applications: Hive 3.1.3, Pig 0.17.0, Hue 4.10.0, JupyterEnterpriseGateway 2.1.0, Spark 3.2.1
Log URI: s3://aws-logs-074831285365-us-east-1/elasticmapreduce/
EMRFS consistent view: Disabled
Custom AMI ID: --
Amazon Linux Release: 2.0.20220606.1 Learn more
Application user interfaces
Persistent user interfaces: --
On-cluster user interfaces: Not Enabled Enable an SSH Connection
Network and hardware
Availability zone: us-east-1b
Subnet ID: subnet-04ed0369ff48942ed
Master: Provisioning 1 m5.xlarge
Core: Provisioning 2 m5.xlarge
Task: --
Cluster scaling: Not enabled
Auto-termination: Terminate if idle for 1 hour
Security and access
Key name: --
EC2 instance profile: EMR_EC2_DefaultRole
EMR role: EMR_DefaultRole
Auto Scaling role: EMR_AutoScaling_DefaultRole
Visible to all users: All Change
Security groups for Master: sg-0f6468cd497c78455 (ElasticMapReduce-master)
Security groups for Core & Task: sg-06317eeab7a22ded0 (ElasticMapReduce-slave)


us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#Instances:instanceState=running
poll_form.php
Canny edge detecti...
Simple guide on ho...
A Neural Network P...
Learner Lab
Canny edge detecti...
Machine Learning u...
TensorFlow Lite Co...
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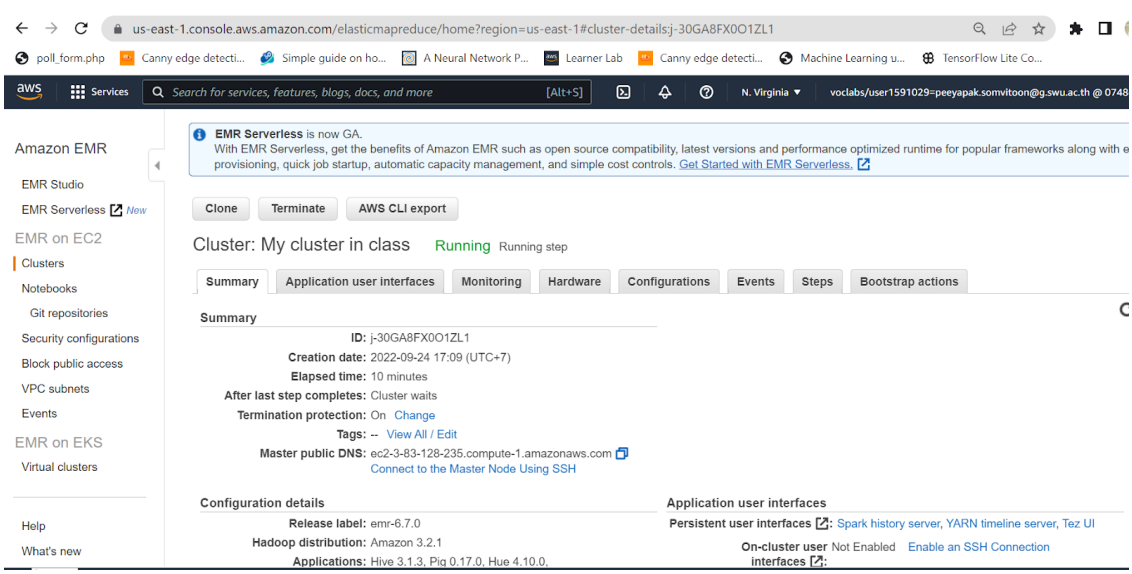
New EC2 Experience
Tell us what you think
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instances (3) Info
Connect
Instance state
Actions
Launch instances
Find instance by attribute or tag (case-sensitive)
Instance state = running
Clear filters
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
- i-07e31bce190575ae0 Running m5.xlarge 2/2 checks passed No alarms us-east-1b
- i-0999c0a6ae2c66806 Running m5.xlarge 2/2 checks passed No alarms us-east-1b
- i-09bd0a75606ac4842 Running m5.xlarge 2/2 checks passed No alarms us-east-1b


us-east-1.console.aws.amazon.com/elasticmapreduce/home?region=us-east-1#cluster-details:j-30GA8FX0O1ZL1
poll_form.php
Canny edge detecti...
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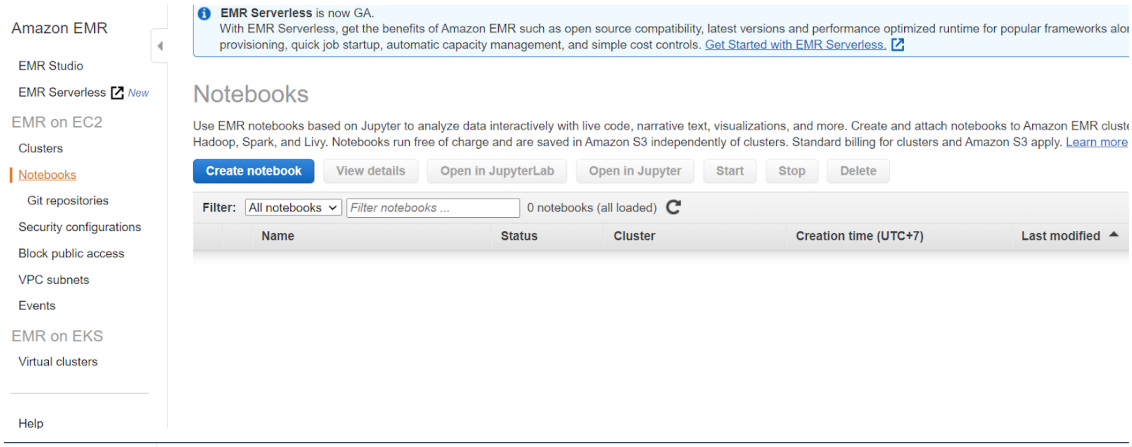
Clone
Terminate
AWS CLI export
Cluster: My cluster in class Running Running step
Summary
Application user interfaces
Monitoring
Hardware
Configurations
Events
Steps
Bootstrap actions
Summary
ID: j-30GA8FX0O1ZL1
Creation date: 2022-09-24 17:09 (UTC+7)
Elapsed time: 10 minutes
After last step completes: Cluster waits
Termination protection: On Change
Tags: -- View All / Edit
Master public DNS: ec2-3-83-128-235.compute-1.amazonaws.com
Connect to the Master Node Using SSH
Configuration details
Release label: emr-6.7.0
Hadoop distribution: Amazon 3.2.1
Applications: Hive 3.1.3, Pig 0.17.0, Hue 4.10.0,
Application user interfaces
Persistent user interfaces: Spark history server, YARN timeline server, Tez UI
On-cluster user interfaces: Not Enabled Enable an SSH Connection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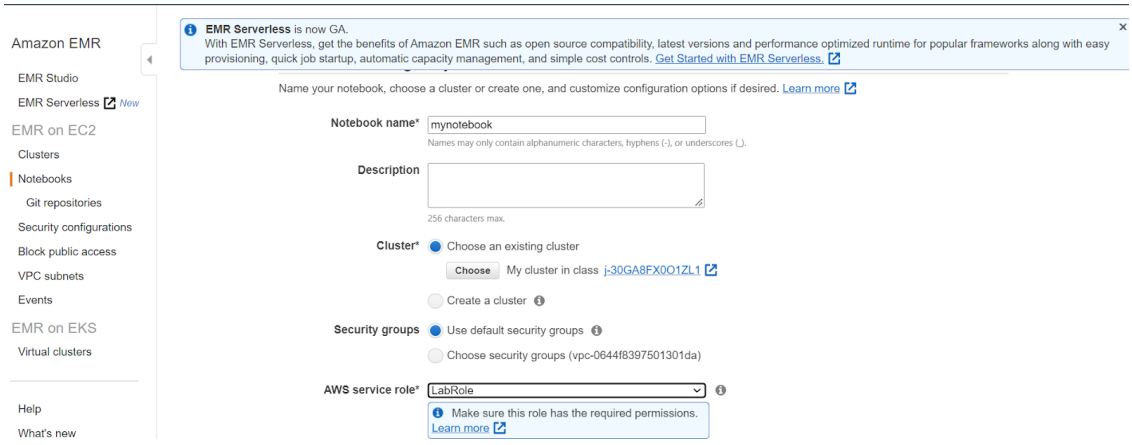
Notebooks
Use EMR notebooks based on Jupyter to analyze data interactively with live code, narrative text, visualizations, and more. Create and attach notebooks to Amazon EMR clust
Hadoop, Spark, and Livy. Notebooks run free of charge and are saved in Amazon S3 independently of clusters. Standard billing for clusters and Amazon S3 apply. Learn more
Create notebook
View details
Open in JupyterLab
Open in Jupyter
Start
Stop
Delete
Filter:
All notebooks
Filter notebooks ...
0 notebooks (all loaded)
Name
Status
Cluster
Creation time (UTC+7)
Last modified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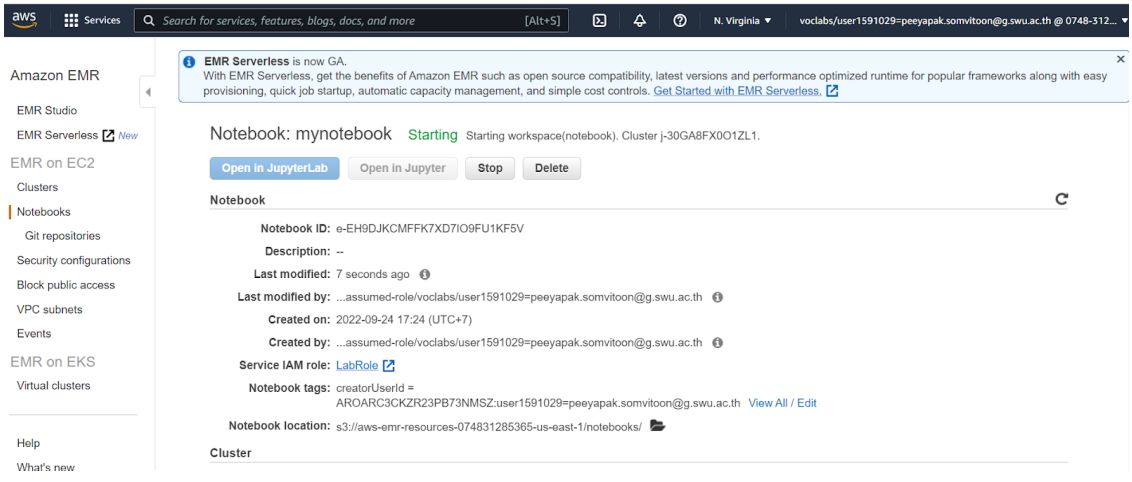
Name your notebook, choose a cluster or create one, and customize configuration options if desired. Learn more
Notebook name*
mynotebook
Names may only contain alphanumeric characters, hyphens (-), or underscores (_).
Description
256 characters max.
Cluster*
Choose an existing cluster
Choose
My cluster in class j-30GA8FX0O1ZL1
Create a cluster
Security groups
Use default security groups
Choose security groups (vpc-0644f8397501301da)
AWS service role*
LabRole
Make sure this role has the required permissions.
Learn more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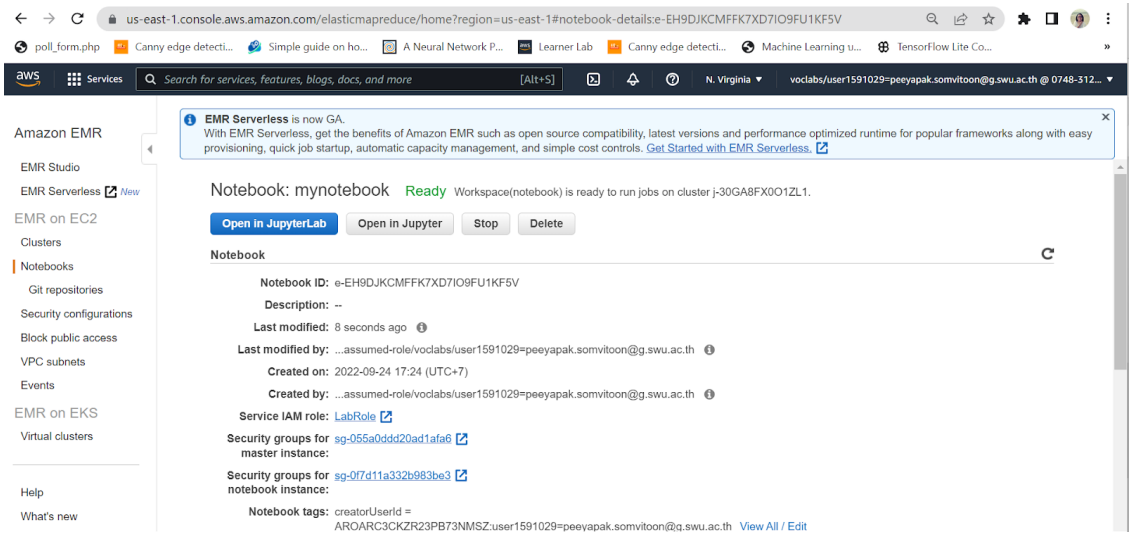
Notebook: mynotebook
Starting
Starting workspace(notebook). Cluster j-30GA8FX0O1ZL1.
Open in JupyterLab
Open in Jupyter
Stop
Delete
Notebook
Notebook ID: e-EH9DJKCMFFK7XD7IO9FU1KF5V
Description: --
Last modified: 7 seconds ago
Last modified by: ...assumed-role/voclabs/user1591029=peeyapak.somvitoon@g.swu.ac.th
Created on: 2022-09-24 17:24 (UTC+7)
Created by: ...assumed-role/voclabs/user1591029=peeyapak.somvitoon@g.swu.ac.th
Service IAM role: LabRole
Notebook tags: creatorUserId = AROARC3CKZR23PB73NMSZ:user1591029=peeyapak.somvitoon@g.swu.ac.th View All / Edit
Notebook location: s3://aws-emr-resources-074831285365-us-east-1/notebooks/
Cluster


us-east-1.console.aws.amazon.com/elasticmapreduce/home?region=us-east-1#notebook-details:e-EH9DJKCMFFK7XD7IO9FU1KF5V
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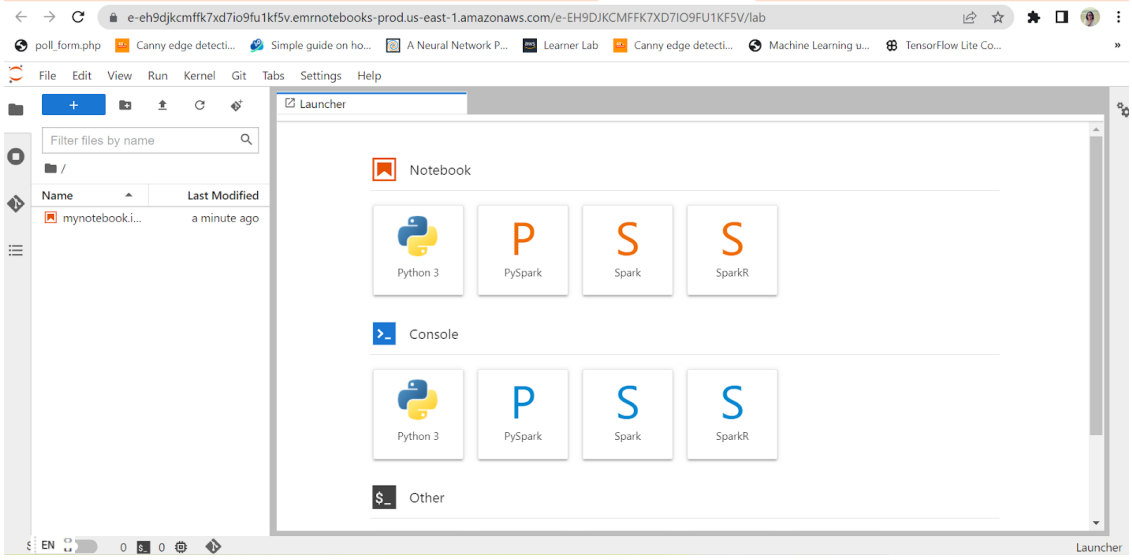
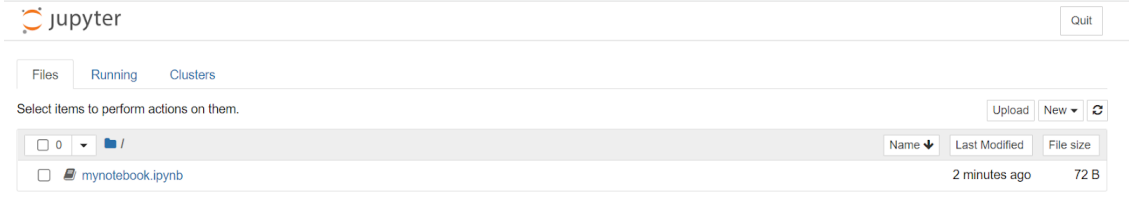
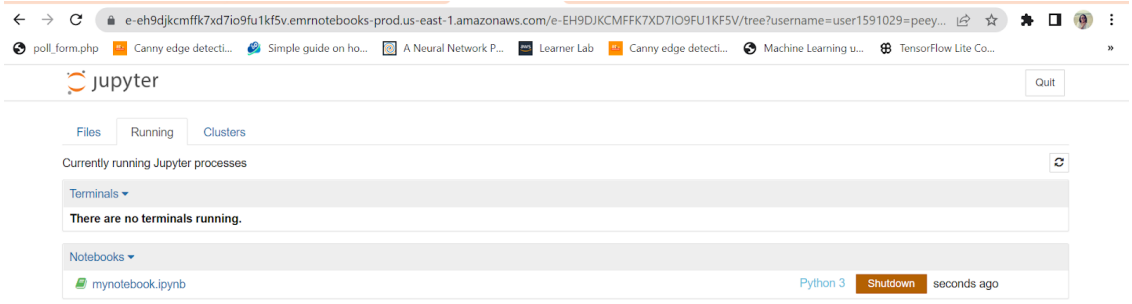
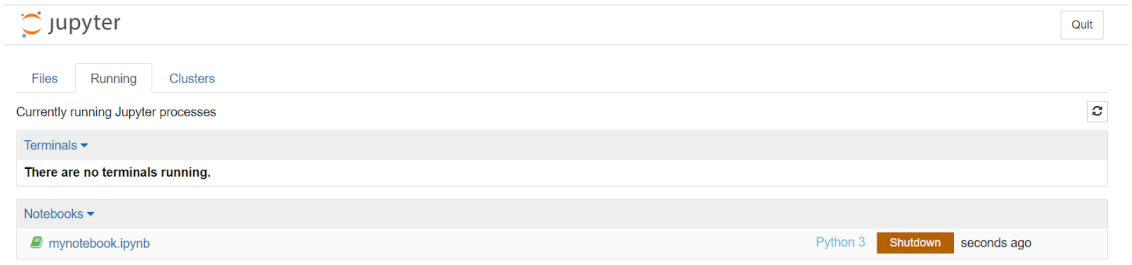
Notebook: mynotebook Ready Workspace(notebook) is ready to run jobs on cluster j-30GA8FX0O1ZL1.
Open in JupyterLab
Open in Jupyter
Stop
Delete
Notebook
Notebook ID: e-EH9DJKCMFFK7XD7IO9FU1KF5V
Description: --
Last modified: 8 seconds ago
Last modified by: ...assumed-role/voclabs/user1591029=peeyapak.somvitoon@g.swu.ac.th
Created on: 2022-09-24 17:24 (UTC+7)
Created by: ...assumed-role/voclabs/user1591029=peeyapak.somvitoon@g.swu.ac.th
Service IAM role: LabRole
Security groups for master instance: sg-055a0ddd20ad1afa6
Security groups for notebook instance: sg-0f7d11a332b983be3
Notebook tags: creatorUserId = AROARC3CKZR23PB73NMSZ:user1591029=peeyapak.somvitoon@g.swu.ac.th View All / Edit


e-eh9djkcmffk7xd7io9fu1kf5v.emrnotebooks-prod.us-east-1.amazonaws.com/e-EH9DJKCMFFK7XD7IO9FU1KF5V/lab
File Edit View Run Kernel Git Tabs Settings Help
Launcher
Filter files by name
Name
Last Modified
mynotebook.i...
a minute ago
Notebook
Python 3
PySpark
Spark
SparkR
Console
Other
Launcher


jupyter
Quit
Files
Running
Clusters
Select items to perform actions on them.
Upload
New
Name
Last Modified
File size
mynotebook.ipynb
2 minutes ago
72 B


e-eh9djkcmffk7xd7io9fu1kf5v.emrnotebooks-prod.us-east-1.amazonaws.com/e-EH9DJKCMFFK7XD7IO9FU1KF5V/tree?username=user1591029=peey...
poll_form.php
Canny edge detecti...
Simple guide on ho...
A Neural Network P...
Learner Lab
Canny edge detecti...
Machine Learning u...
TensorFlow Lite Co...
jupyter
Quit
Files
Running
Clusters
Currently running Jupyter processes
Terminals
There are no terminals running.
Notebooks
mynotebook.ipynb
Python 3
Shutdown
seconds ago


jupyter
Quit
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There are no terminals running.
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mynotebook.ipynb
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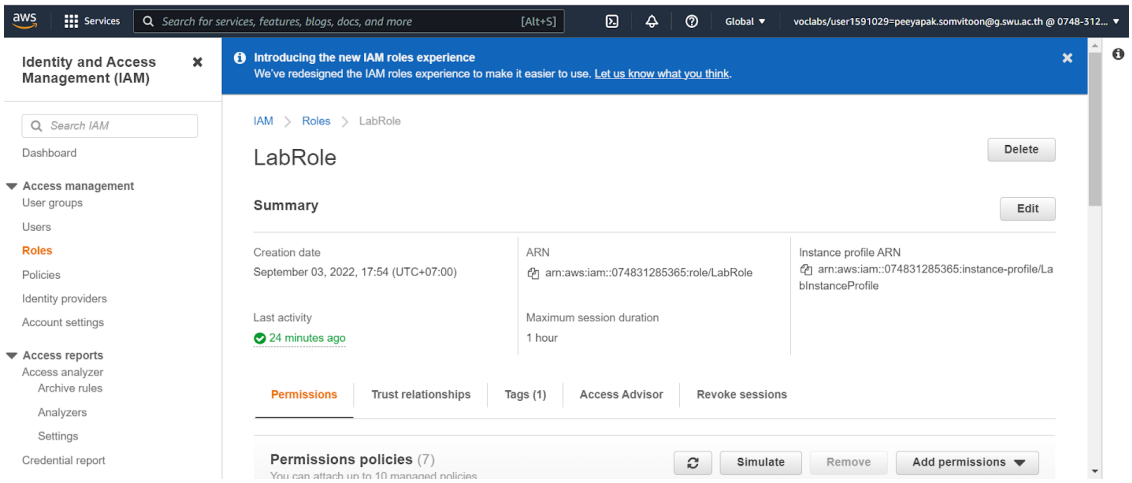
seconds ago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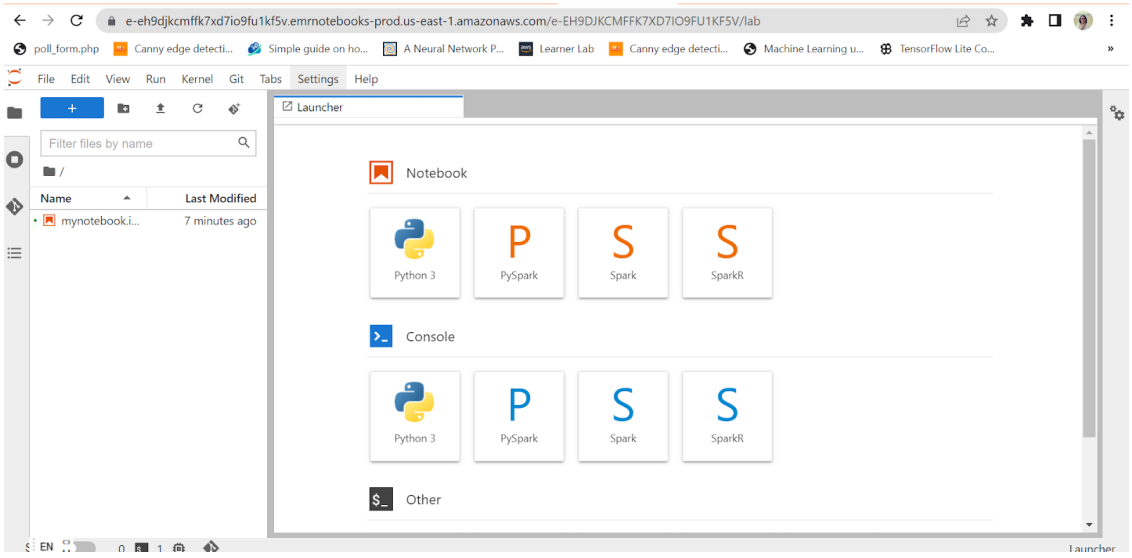
Identity and Access Management (IAM)
Search IAM
Dashboard
Access management
User groups
Users
Roles
Policies
Identity providers
Account settings
Access reports
Access analyzer
Archive rules
Analyzers
Settings
Credential report
Introducing the new IAM roles experience
We've redesigned the IAM roles experience to make it easier to use. Let us know what you think.
IAM > Roles > LabRole
LabRole
Delete
Summary
Edit
Creation date
September 03, 2022, 17:54 (UTC+07:00)
ARN
arn:aws:iam::074831285365:role/LabRole
Instance profile ARN
arn:aws:iam::074831285365:instance-profile/LabInstanceProfile
Last activity
24 minutes ago
Maximum session duration
1 hour
Permissions
Trust relationships
Tags (1)
Access Advisor
Revoke sessions
Permissions policies (7)
You can attach up to 10 managed policies
Simulate
Remove
Add permissions



jupyter **Untitled** Last Checkpoint: 3 minutes ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted | PySpark

Run Code nbdiff

In [1]:
```
from pyspark.sql import SparkSession
```

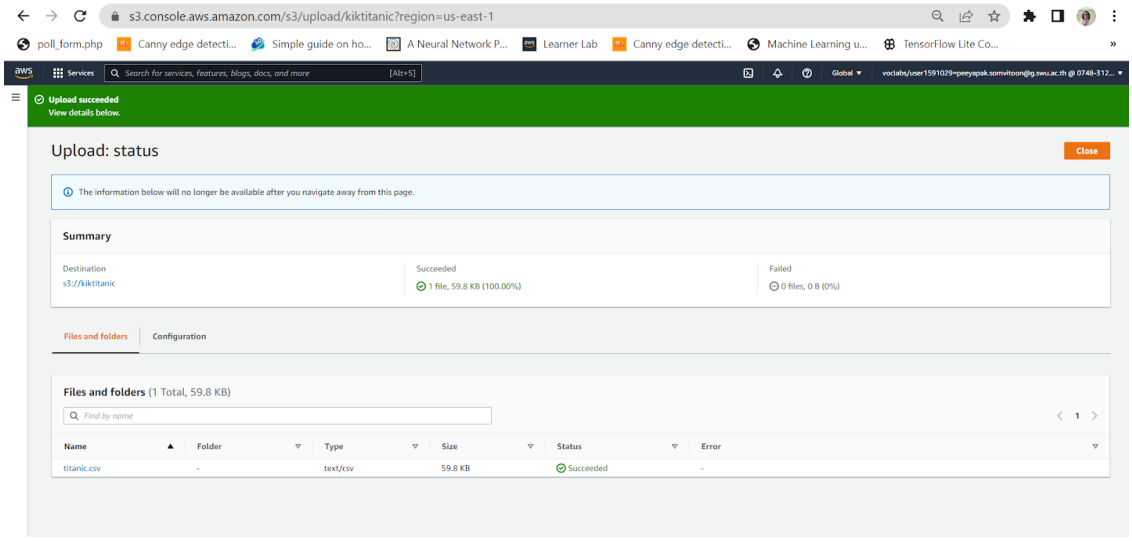
```
Starting Spark application
```

ID	YARN Application ID	Kind	State	Spark UI	Driver log	User	Current session?
0	application_1664014599155_0001	pyspark	idle	Link	Link	None	✓

```
SparkSession available as 'spark'.
```

In [2]:
```
spark = SparkSession.builder \
    .appName("ETL") \
    .getOrCreate()
```

In [ ]:



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File Edit View Insert Cell Kernel Widgets Help Trusted PySpark

Run Code nbdiff

In [1]:
```
from pyspark.sql import SparkSession
```

```
Starting Spark application
```

ID	YARN Application ID	Kind	State	Spark UI	Driver log	User	Current session?
0	application_1664014599155_0001	pyspark	idle	Link	Link	None	✓

```
SparkSession available as 'spark'.
```

In [2]:
```
spark = SparkSession.builder \
    .appName("ETL") \
    .getOrCreate()
```

In [3]:
```
bucket = "s3://kiktitanic"
```

In [5]:
```
df = spark.read.csv(bucket)
```

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Run Code nbdiff

In [3]:
```
bucket = "s3://kiktitanic"
```

In [5]:
```
df = spark.read.csv(bucket)
```

Spark Job Progress

Job [0]: csv at NativeMethodAccessorImpl.java:0

Progress for csv at NativeMethodAccessorImpl.j… Job Progress: 1/1 Tasks…

Stage [ID]: name at [sou…	Status	Task Progress	Elapsed Time (s…	Failed Tas…
Stage [0]: csv at NativeMet…	COMP…	1/1	5.601	

In [7]:
```
df = spark.read.option('header', 'true').csv(bucket)
```

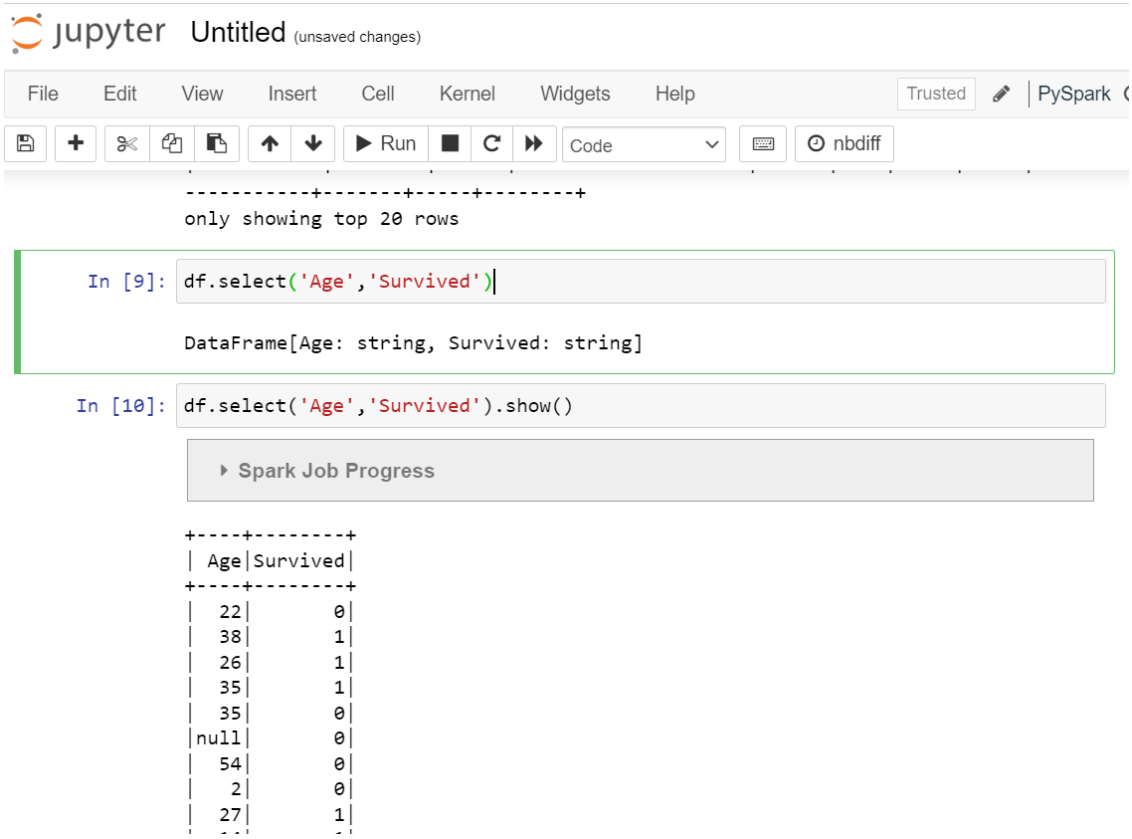
In [7]:
```
df = spark.read.option('header', 'true').csv(bucket)
```

Spark Job Progress

In [8]:
```
df.show()
```

Spark Job Progress

```
+-----------+--------+------+--------------------+------+----+-----+-----+----------------+-------+--
---+--------+
|PassengerId|Survived|Pclass|                Name|   Sex| Age|SibSp|Parch|          Ticket|   Fare|Ca
bin|Embarked|
+-----------+--------+------+--------------------+------+----+-----+-----+----------------+-------+--
---+--------+
|          1|       0|     3|Braund, Mr. Owen ...|  male|  22|    1|    0|       A/5 21171|   7.25| n
ull|       S|
|          2|       1|     1|Cumings, Mrs. Joh...|female|  38|    1|    0|        PC 17599|71.2833|
```


jupyter Untitled (unsaved changes)
File Edit View Insert Cell Kernel Widgets Help
Trusted
PySpark
Run
Code
nbdiff
----------+-------+-----+--------+
only showing top 20 rows
In [9]:
df.select('Age','Survived')
DataFrame[Age: string, Survived: string]
In [10]:
df.select('Age','Survived').show()
Spark Job Progress
+----+--------+
| Age|Survived|
+----+--------+
22	0
38	1
26	1
35	1
35	0
null	0
54	0
2	0
27	1

In [12]:
```
df.createOrReplaceTempView("titanic")
```

In [14]:
```
spark.sql("""
    select
        Age
        , Survived
    from
        titanic
""").show()
```

▸ Spark Job Progress

```
+----+--------+
| Age|Survived|
+----+--------+
|  22|       0|
|  38|       1|
|  26|       1|
|  35|       1|
|  35|       0|
|null|       0|
|  54|       0|
```

jupyter Untitled Last Checkpoint: 32 minutes ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted | PySpark

Run Code nbdiff

```
|   2|       0|
|null|       1|
|  31|       0|
|null|       1|
+----+--------+
only showing top 20 rows
```

In [15]:
```
result = spark.sql("""
    select
        Age
        , Survived
    from
        titanic
""")
```

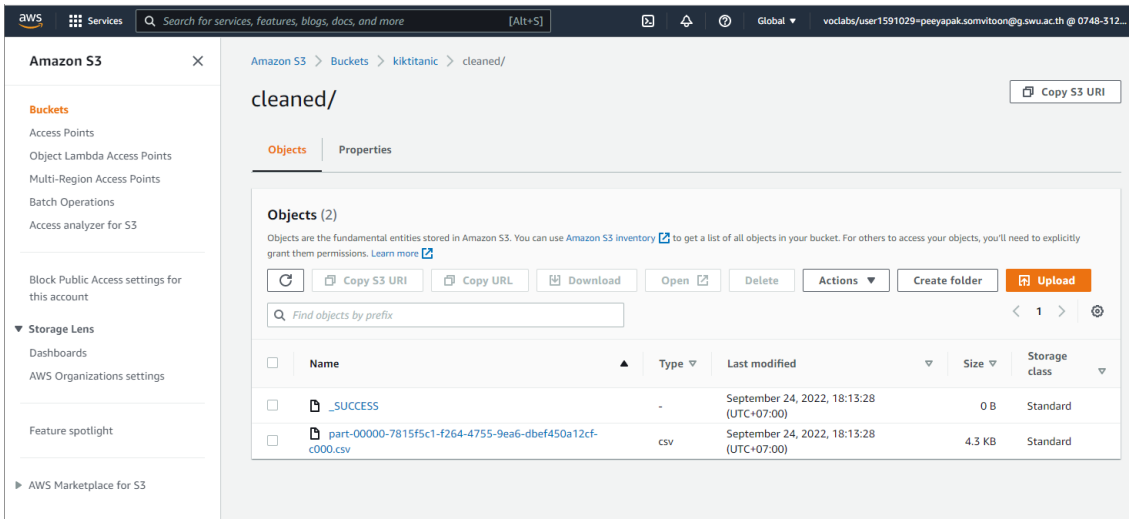
In [16]:
```
result.show(3)
```

▸ Spark Job Progress

```
+---+--------+
|Age|Survived|
+---+--------+
| 22|       0|
| 38|       1|
| 26|       1|
+---+--------+
only showing top 3 rows
```

In [17]:
```
result.write.mode("overwrite").csv("s3://kiktitanic/cleaned")
```

▸ Spark Job Progress



jupyter Untitled Last Checkpoint: 37 minutes ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

Run Code nbdiff

```
        titanic
""")
```

In [16]:
```
result.show(3)
```

▸ Spark Job Progress

```
+---+--------+
|Age|Survived|
+---+--------+
| 22|       0|
| 38|       1|
| 26|       1|
+---+--------+
only showing top 3 rows
```

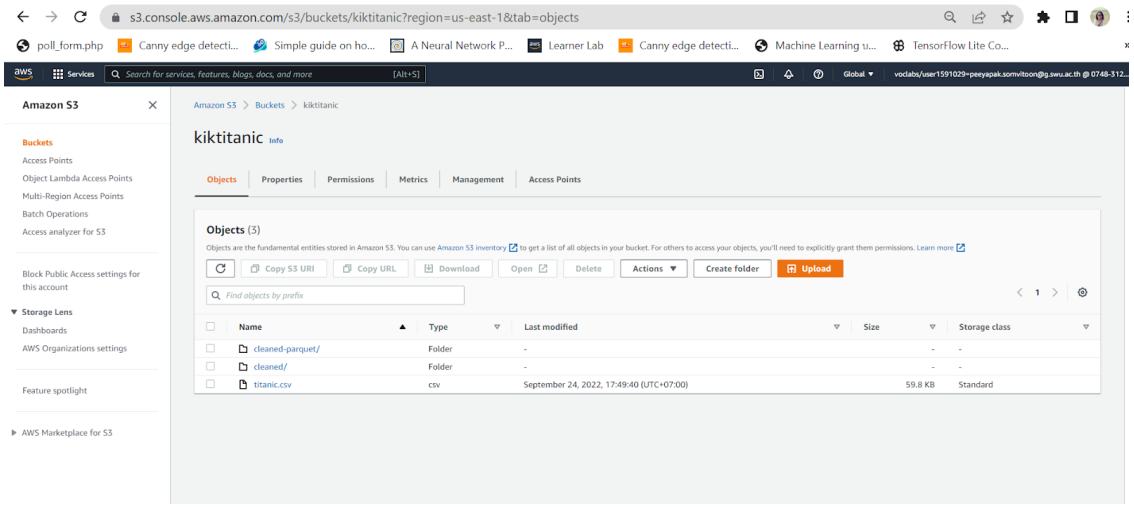
In [17]:
```
result.write.mode("overwrite").csv("s3://kiktitanic/cleaned")
```

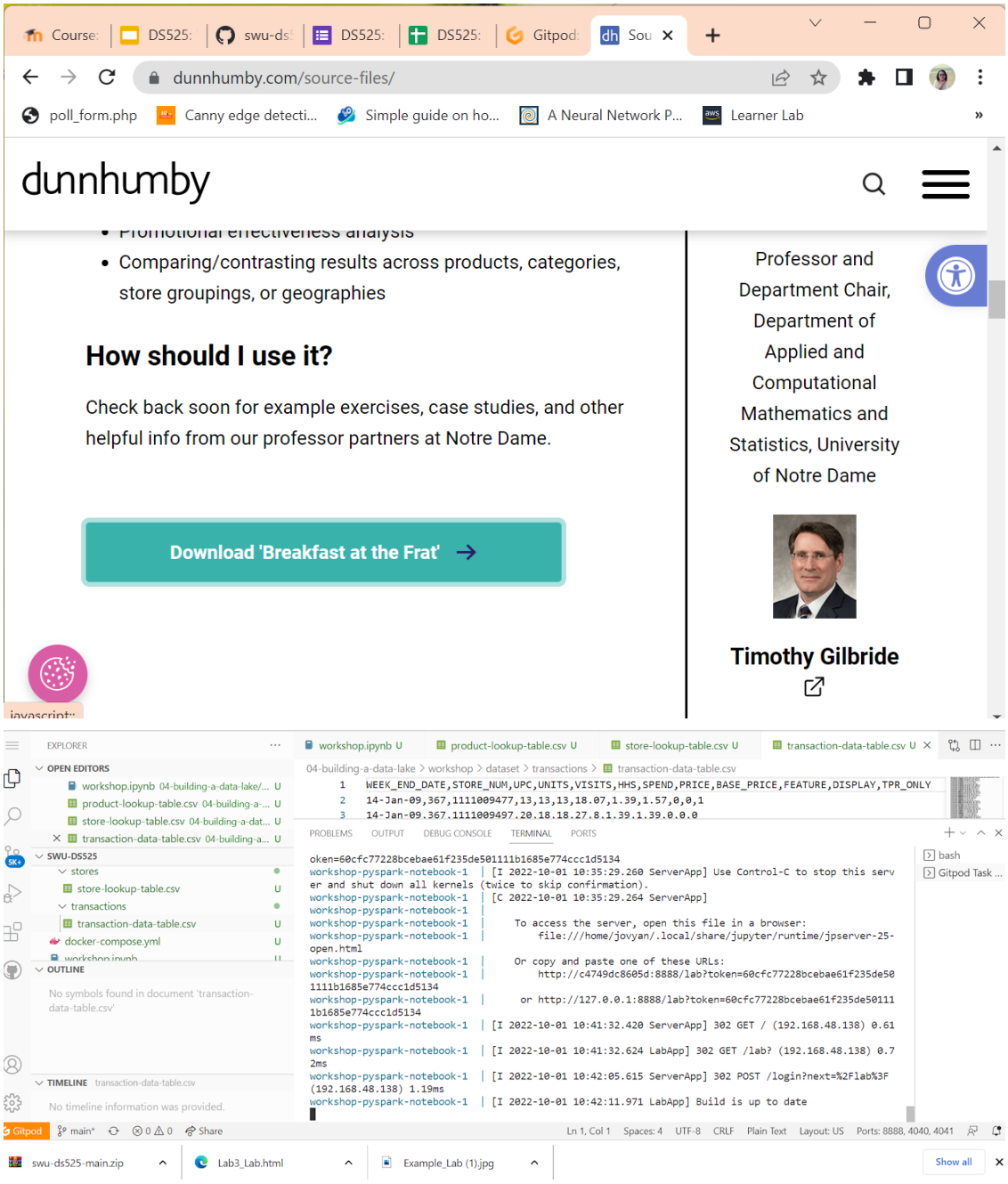
▸ Spark Job Progress

In [18]:
```
result.write.mode("overwrite").parquet("s3://kiktitanic/cleaned-parquet")
```

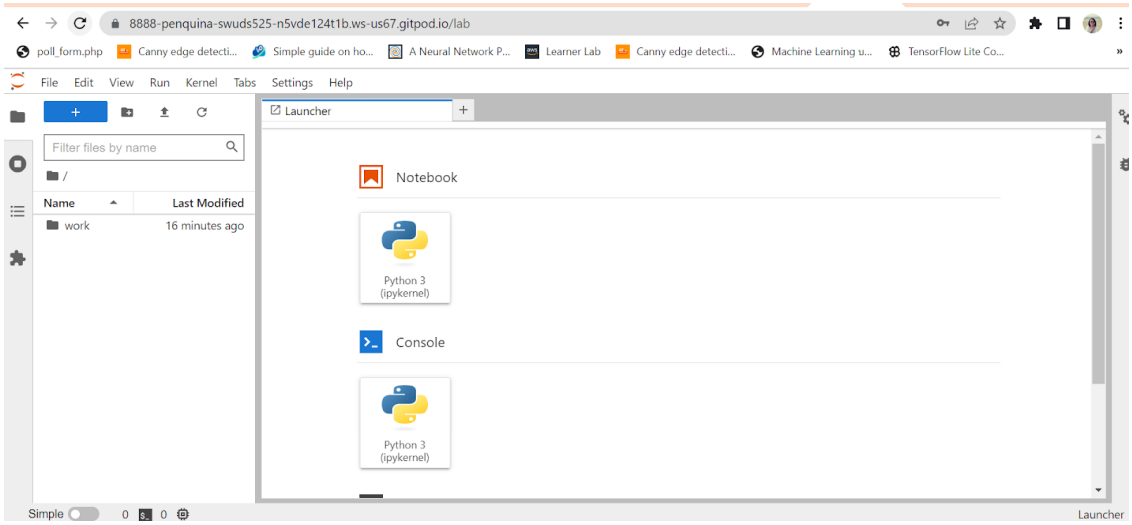
▸ Spark Job Progress

In [ ]:




dunnhumby.com/source-files/
poll_form.php
Canny edge detecti...
Simple guide on ho...
A Neural Network P...
Learner Lab
dunnhumby
Comparing/contrasting results across products, categories, store groupings, or geographies
How should I use it?
Check back soon for example exercises, case studies, and other helpful info from our professor partners at Notre Dame.
Download 'Breakfast at the Frat'
Professor and Department Chair, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame
Timothy Gilbride

EXPLORER
OPEN EDITORS
workshop.ipynb 04-building-a-data-lake/... U
product-lookup-table.csv 04-building-a-... U
store-lookup-table.csv 04-building-a-dat... U
transaction-data-table.csv 04-building-a... U
SWU-DS525
stores
store-lookup-table.csv U
transactions
transaction-data-table.csv U
docker-compose.yml U
OUTLINE
No symbols found in document 'transaction-data-table.csv'
TIMELINE transaction-data-table.csv
No timeline information was provided.
workshop.ipynb U
product-lookup-table.csv U
store-lookup-table.csv U
transaction-data-table.csv U
04-building-a-data-lake > workshop > dataset > transactions > transaction-data-table.csv
1 WEEK_END_DATE,STORE_NUM,UPC,UNITS,VISITS,HHS,SPEND,PRICE,BASE_PRICE,FEATURE,DISPLAY,TPR_ONLY
2 14-Jan-09,367,1111009477,13,13,13,18.07,1.39,1.57,0,0,1
3 14-Jan-09,367,1111009497,20,18,18,27,8,1,39,1,39,0,0,0
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
oken=60cfc77228bcebae61f235de501111b1685e774ccc1d5134
workshop-pyspark-notebook-1 | [I 2022-10-01 10:35:29.260 ServerApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
workshop-pyspark-notebook-1 | [C 2022-10-01 10:35:29.264 ServerApp]
workshop-pyspark-notebook-1 |
workshop-pyspark-notebook-1 | To access the server, open this file in a browser:
workshop-pyspark-notebook-1 | file:///home/jovyan/.local/share/jupyter/runtime/jpserver-25-open.html
workshop-pyspark-notebook-1 | Or copy and paste one of these URLs:
workshop-pyspark-notebook-1 | http://c4749dc8605d:8888/lab?token=60cfc77228bcebae61f235de501111b1685e774ccc1d5134
workshop-pyspark-notebook-1 | or http://127.0.0.1:8888/lab?token=60cfc77228bcebae61f235de501111b1685e774ccc1d5134
workshop-pyspark-notebook-1 | [I 2022-10-01 10:41:32.420 ServerApp] 302 GET / (192.168.48.138) 0.61ms
workshop-pyspark-notebook-1 | [I 2022-10-01 10:41:32.624 LabApp] 302 GET /lab? (192.168.48.138) 0.72ms
workshop-pyspark-notebook-1 | [I 2022-10-01 10:42:05.615 ServerApp] 302 POST /login?next=%2Flab%3F (192.168.48.138) 1.19ms
workshop-pyspark-notebook-1 | [I 2022-10-01 10:42:11.971 LabApp] Build is up to date
bash
Gitpod Task ...
Gitpod main* 0 0 Share
Ln 1, Col 1 Spaces: 4 UTF-8 CRLF Plain Text Layout: US Ports: 8888, 4040, 4041
swu-ds525-main.zip
Lab3_Lab.html
Example_Lab (1).jpg
Show all

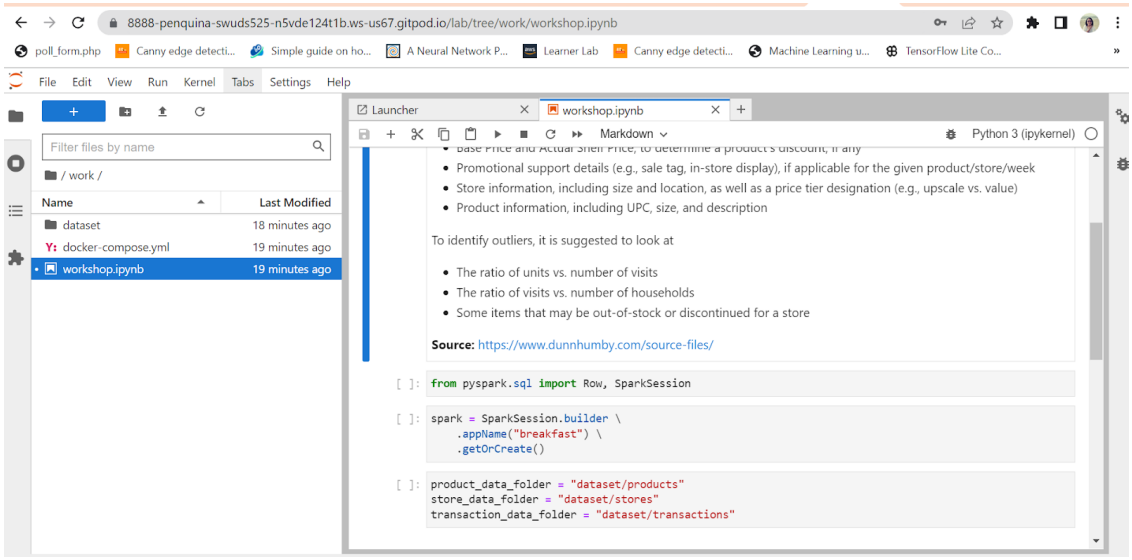


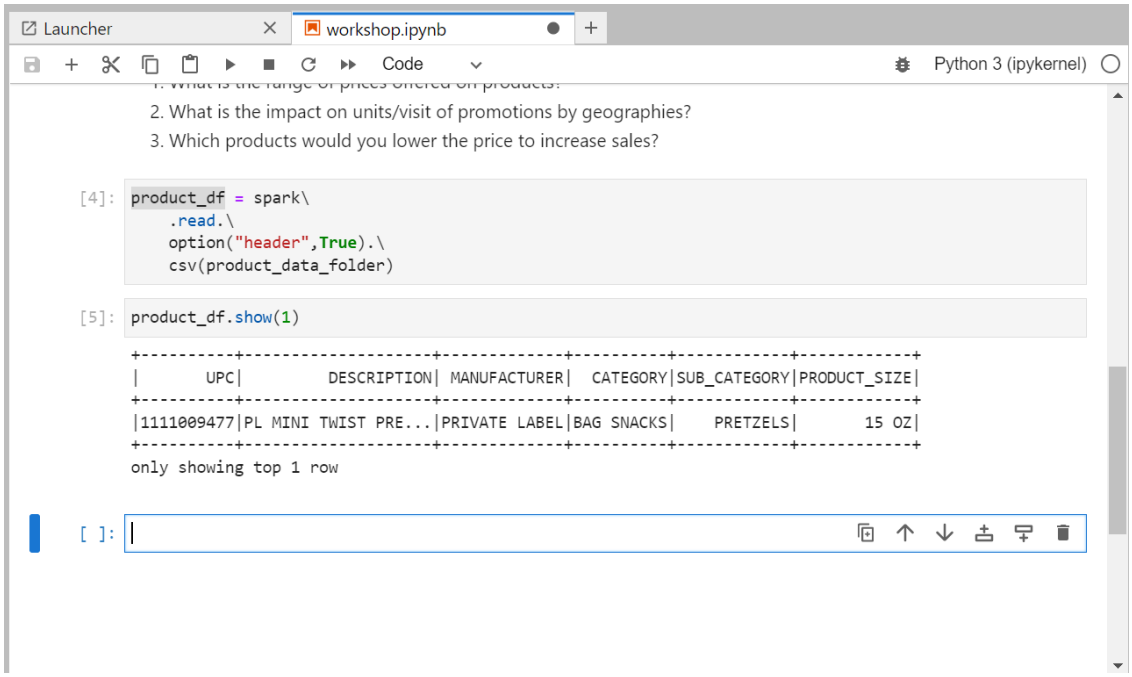
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

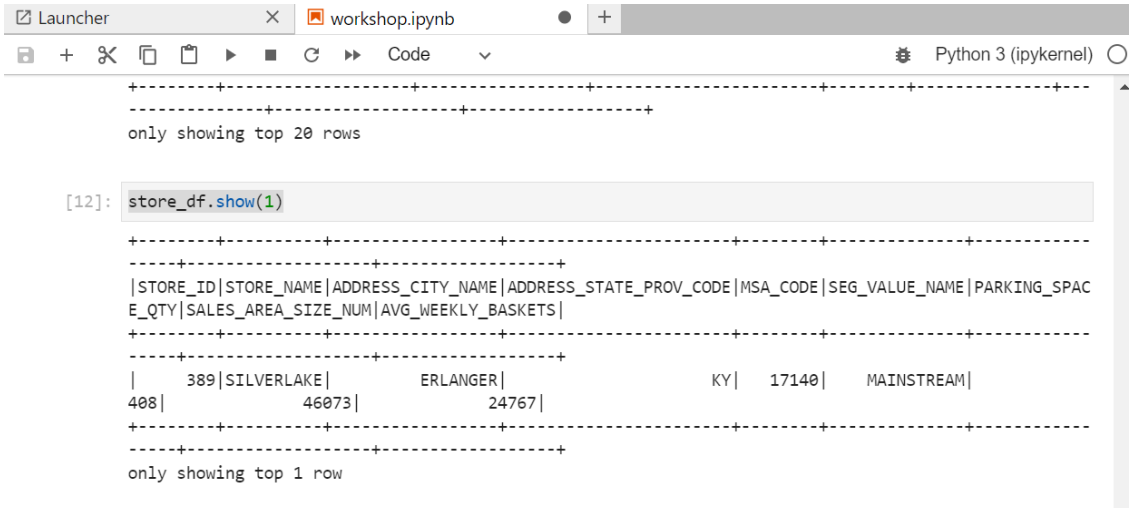
```
oken=60cfc77228bcebae61f235de501111b1685e774ccc1d5134
workshop-pyspark-notebook-1  | [I 2022-10-01 10:35:29.260 ServerApp] Use Control-C to stop this serv
er and shut down all kernels (twice to skip confirmation).
workshop-pyspark-notebook-1  | [C 2022-10-01 10:35:29.264 ServerApp]
workshop-pyspark-notebook-1  |
workshop-pyspark-notebook-1  |     To access the server, open this file in a browser:
workshop-pyspark-notebook-1  |         file:///home/jovyan/.local/share/jupyter/runtime/jpserver-25-
open.html
workshop-pyspark-notebook-1  |     Or copy and paste one of these URLs:
workshop-pyspark-notebook-1  |         http://c4749dc8605d:8888/lab?token=60cfc77228bcebae61f235de50
1111b1685e774ccc1d5134
workshop-pyspark-notebook-1  |      or http://127.0.0.1:8888/lab?token=60cfc77228bcebae61f235de50111
1b1685e774ccc1d5134
workshop-pyspark-notebook-1  | [I 2022-10-01 10:41:32.420 ServerApp] 302 GET / (192.168.48.138) 0.61
ms
workshop-pyspark-notebook-1  | [I 2022-10-01 10:41:32.624 LabApp] 302 GET /lab? (192.168.48.138) 0.7
2ms
workshop-pyspark-notebook-1  | [I 2022-10-01 10:42:05.615 ServerApp] 302 POST /login?next=%2Flab%3F
(192.168.48.138) 1.19ms
workshop-pyspark-notebook-1  | [I 2022-10-01 10:42:11.971 LabApp] Build is up to date
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Port	Address
3000	https://3000-penquina-swuds525-n5vde124t1b.ws-us67.gitpod.io
4040	https://4040-penquina-swuds525-n5vde124t1b.ws-us67.gitpod.io
4041	https://4041-penquina-swuds525-n5vde124t1b.ws-us67.gitpod.io
8888	https://8888-penquina-swuds525-n5vde124t1b.ws-us67.gitpod.io


8888-penquina-swuds525-n5vde124t1b.ws-us67.gitpod.io/lab/tree/work/workshop.ipynb
File Edit View Run Kernel Tabs Settings Help
Launcher
workshop.ipynb
Markdown
Python 3 (ipykernel)
Filter files by name
/ work /
Name
Last Modified
dataset 18 minutes ago
docker-compose.yml 19 minutes ago
workshop.ipynb 19 minutes ago
Promotional support details (e.g., sale tag, in-store display), if applicable for the given product/store/week
Store information, including size and location, as well as a price tier designation (e.g., upscale vs. value)
Product information, including UPC, size, and description
To identify outliers, it is suggested to look at
The ratio of units vs. number of visits
The ratio of visits vs. number of households
Some items that may be out-of-stock or discontinued for a store
Source: https://www.dunnhumby.com/source-files/
[ ]: from pyspark.sql import Row, SparkSession
[ ]: spark = SparkSession.builder \
.appName("breakfast") \
.getOrCreate()
[ ]: product_data_folder = "dataset/products"
store_data_folder = "dataset/stores"
transaction_data_folder = "dataset/transactions"


Launcher
workshop.ipynb
Code
Python 3 (ipykernel)
2. What is the impact on units/visit of promotions by geographies?
3. Which products would you lower the price to increase sales?
[4]: product_df = spark\
.read.\
option("header",True).\
csv(product_data_folder)
[5]: product_df.show(1)
+----------+--------------------+-------------+----------+------------+------------+
| UPC| DESCRIPTION| MANUFACTURER| CATEGORY|SUB_CATEGORY|PRODUCT_SIZE|
+----------+--------------------+-------------+----------+------------+------------+
|1111009477|PL MINI TWIST PRE...|PRIVATE LABEL|BAG SNACKS| PRETZELS| 15 OZ|
+----------+--------------------+-------------+----------+------------+------------+
only showing top 1 row
[ ]:


Launcher
workshop.ipynb
Code
Python 3 (ipykernel)
+--------+------------------+----------------+----------------------+--------+-------------+---
-------------+------------------+-----------------+
only showing top 20 rows
[12]:
store_df.show(1)
+--------+----------+----------------+----------------------+--------+-------------+----------
-----+------------------+-----------------+
|STORE_ID|STORE_NAME|ADDRESS_CITY_NAME|ADDRESS_STATE_PROV_CODE|MSA_CODE|SEG_VALUE_NAME|PARKING_SPAC
E_QTY|SALES_AREA_SIZE_NUM|AVG_WEEKLY_BASKETS|
+--------+----------+----------------+----------------------+--------+-------------+----------
-----+------------------+-----------------+
| 389|SILVERLAKE| ERLANGER| KY| 17140| MAINSTREAM|
408| 46073| 24767|
+--------+----------+----------------+----------------------+--------+-------------+----------
-----+------------------+-----------------+
only showing top 1 row

```
product_df.createOrReplaceTempView("products")
transaction_df.createOrReplaceTempView("transactions")
```

```
#Range of price
spark.sql("""
    select
        products.upc
        , min(price)
        , max(price)
        , description
        , category

    from transactions
    join products
    on
        transactions.upc = products.upc
    group by
        1, 4, 5
""").show(3)
```

```
+----------+----------+----------+--------------------+----------+
|       upc|min(price)|max(price)|         description|  category|
+----------+----------+----------+--------------------+----------+
|1111009477|      0.89|      1.83|PL MINI TWIST PRE...|BAG SNACKS|
|1111009497|      0.86|      1.69|   PL PRETZEL STICKS|BAG SNACKS|
|1111009507|       0.8|      1.69|   PL TWIST PRETZELS|BAG SNACKS|
+----------+----------+----------+--------------------+----------+
only showing top 3 rows
```