Day 10 – Spark – Accenture bootcamp

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GitHub Link - https://github.com/mewanmadusha/Learning2024/tree/main/day-10-spark-bootcamp

Spark performance research

Google for posts related to Spark performance for various implementations: Spark Scala, PySpark, Spark,Java, express your own opinion in free from and send it via email.

Reference –
Scala vs Java vs Pyspark - Which is better ?
https://www.linkedin.com/feed/update/urn:li:activity:7072258588278210561/

PySpark vs Spark-Scala
https://medium.datadriveninvestor.com/pyspark-vs-spark-scala-b3a744d91846

Scala Spark vs Python PySpark: Which is better?
https://mungingdata.com/apache-spark/python-pyspark-scala-which-better/

Scala vs PySpark: Choosing the Right Language for Parallel Processing in Spark
https://medium.com/@mohitdaxini75/scala-vs-pyspark-choosing-the-right-language-for-parallel-processing-in-spark-6ff996389f53

Based on the above articles, comparing Scala, Java, PySpark from Apache spark development we can be able to find following things.
To evaluate the comparison, I have summarized things into the table,

	Scala	Java	PySpark
Advantages	-This is the native and primary language to build Spark systems. -Since Scala compilation can be run under JVM we can get good performance -Ability to do the functional programming -Since Scala using datasets it's compile time safe -Type safe – because Scala written in static type	-Performance was more or less comparing to Scala, but most of the cases Scala was performing better. -Scalability -Mature ecosystem and wide range of tools can be interreact with Java -Since most of the backend development done in Java microservices most of the time developers can	-Easy to handle with Python that means Simplicity and productivity with clean and expressive Python syntax -More compatible with data science eco system -Since Python using data frames it's not compile time safe -Less type safety compared to Scala and java because Python written in

		adhere Java spark into microservice architecture -Since Java using datasets it’s compile time safe	dynamically typed language
Drawbacks/Need to consider before choose	-Bigger learning curve -Similar to previous drawback as well but Scala having more complex syntax and we need to do more work around to implement same task when compared with python	-It takes much time for development process	-Performance drawback when running under python interpreter

Conclusion

Based on the comparison, if you developers don’t have much coding experience or prefer using graphical tools for data processing, PySpark is a good pick because it's easy to use. However, if they are really focused on making things run super-fast and don't mind spending a bit more time learning, Scala and Java are better options. Java is especially good if those who are working with big business systems. Finally we can choose PySpark for simplicity, Java or Scala for top speed

Using PySpark complete following tasks

Tasks:
Solve the given Tasks by writing your code solution:

Create conda environment and install pyspark

conda create -n sparkenv python numpy pandas

```
mewanmadusha — -zsh — 138×37
(base) mewanmadusha@Mewans-MacBook-Air-M1 ~ %
(base) mewanmadusha@Mewans-MacBook-Air-M1 ~ % conda env list
# conda environments:
#
base                  *  /Users/mewanmadusha/miniconda3
bdb                      /Users/mewanmadusha/miniconda3/envs/bdb
env1                     /Users/mewanmadusha/miniconda3/envs/env1
env2py39                 /Users/mewanmadusha/miniconda3/envs/env2py39
env3tf29                 /Users/mewanmadusha/miniconda3/envs/env3tf29

(base) mewanmadusha@Mewans-MacBook-Air-M1 ~ %
(base) mewanmadusha@Mewans-MacBook-Air-M1 ~ % conda create -n sparkenv python numpy pandas
Collecting package metadata (current_repodata.json): done
Solving environment: done


==> WARNING: A newer version of conda exists. <==
  current version: 23.1.0
  latest version: 23.11.0

Please update conda by running

    $ conda update -n base -c defaults conda

Or to minimize the number of packages updated during conda update use

     conda install conda=23.11.0



## Package Plan ##

  environment location: /Users/mewanmadusha/miniconda3/envs/sparkenv

  added / updated specs:
    - numpy
    - pandas
```

conda activate sparkenv

conda install -c conda-forge pyspark

```
mewanmadusha — -zsh — 162×45
(base) mewanmadusha@Mewans-MacBook-Air-M1 ~ % conda activate sparkenv
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ %
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ %
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ % python -version
Unknown option: -e
usage: python [option] ... [-c cmd | -m mod | file | -] [arg] ...
Try `python -h' for more information.
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ % python --version
Python 3.12.0
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ %
(sparkenv) mewanmadusha@Mewans-MacBook-Air-M1 ~ % conda install -c conda-forge pyspark
Collecting package metadata (current_repodata.json): done
Solving environment: done


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## Package Plan ##

  environment location: /Users/mewanmadusha/miniconda3/envs/sparkenv

  added / updated specs:
    - pyspark


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    abseil-cpp-20211102.0      |       h6b3803e_1        1000 KB  conda-forge
    arrow-cpp-11.0.0           |       hc7aafb3_2         6.7 MB
    aws-c-common-0.6.8         |       h80987f9_1         156 KB
    aws-c-event-stream-0.1.6   |       h313beb8_6          24 KB
```
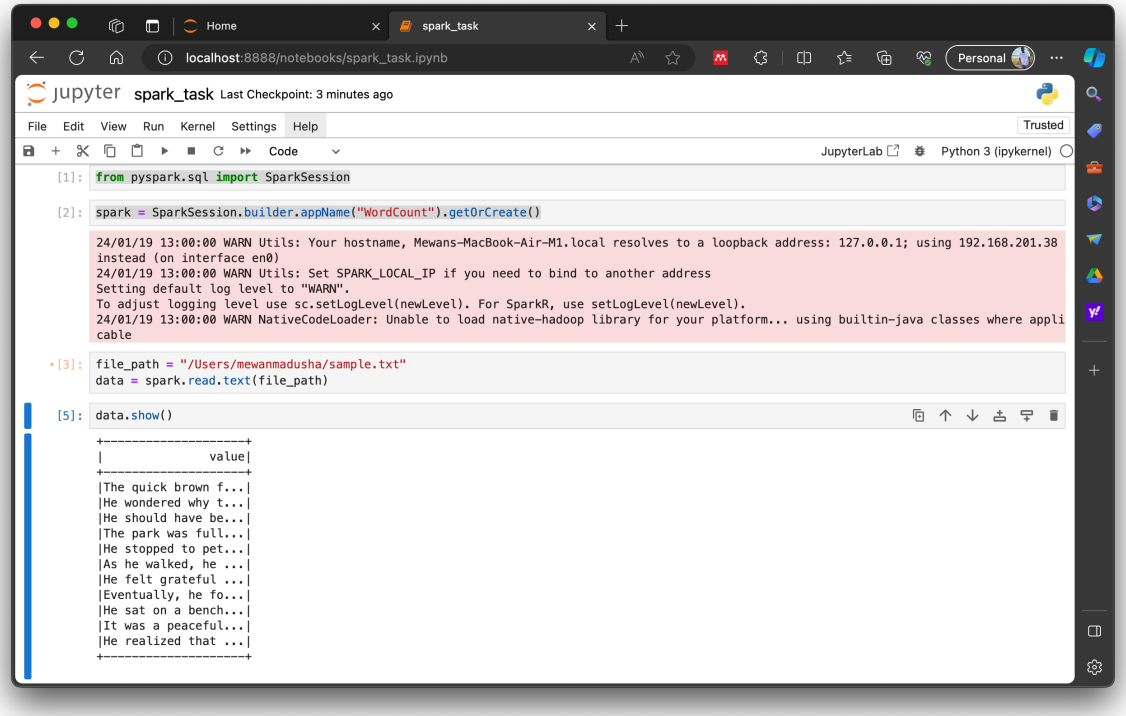

Install Jupiter notebook

pip install notebook

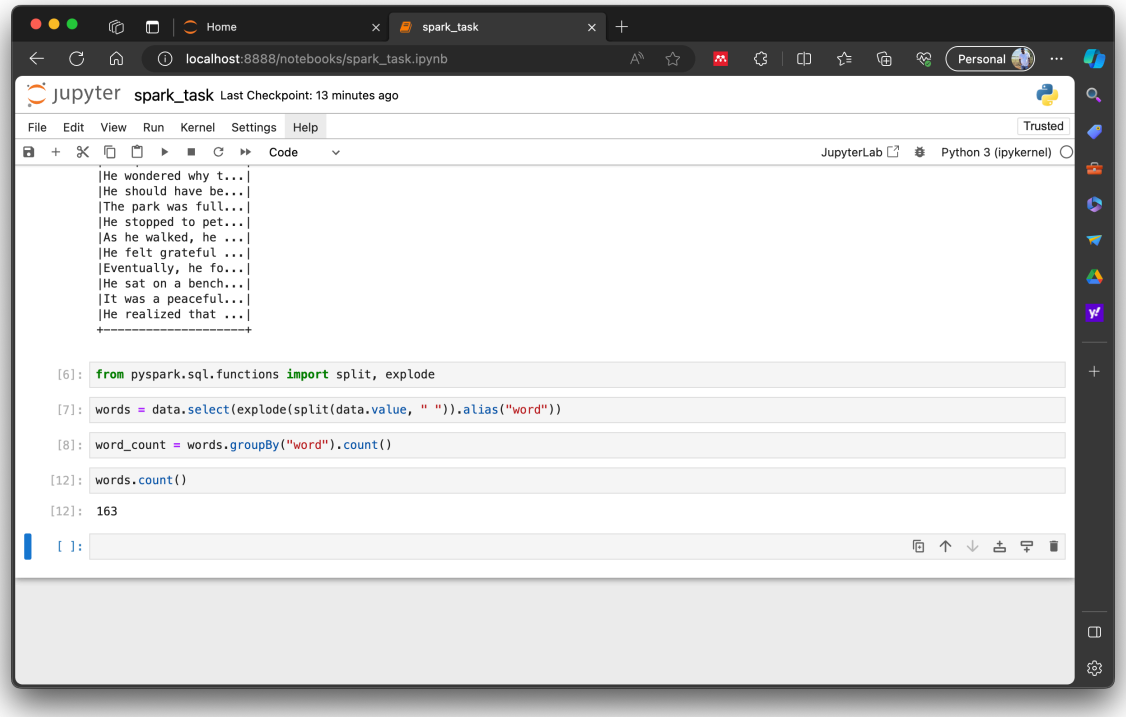
1. Read the data using “sample.txt” as a source data.

```
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("WordCount").getOrCreate()
file_path = "/Users/mewanmadusha/sample.txt"
data = spark.read.text(file_path)
```



2. Count the number of words.

```
from pyspark.sql.functions import split, explode
words = data.select(explode(split(data.value, " ")).alias("word"))
word_count = words.groupBy("word").count()
words.count()
```



3. Count the number of word appearances.

```
word_count = words.groupBy("word").count()
```

Home | spark_task

localhost:8888/notebooks/spark_task.ipynb

jupyter spark_task Last Checkpoint: 25 minutes ago

File Edit View Run Kernel Settings Help Trusted

Code JupyterLab Python 3 (ipykernel)

[7]:
```
words = data.select(explode(split(data.value, " ")).alias("word"))
```

[8]:
```
word_count = words.groupBy("word").count()
```

[12]:
```
words.count()
```

[12]:
```
163
```

[18]:
```
word_count.show(100)
```

```
+-----------+-----+
|       word|count|
+-----------+-----+
|     trees.|    1|
|    flowers|    1|
|      bench|    1|
|   Instead,|    1|
|       even|    1|
|       lazy|    2|
|   grateful|    1|
|     fluffy|    1|
|  continued|    1|
|      park,|    1|
|   colorful|    1|
|        was|    5|
|       park|    1|
|     jumped|    1|
|       it's|    1|
|      bring|    1|
|        dog|    2|
|       way.|    1|
|   enjoying|    1|
```