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PySpark Lab

8A BSCS MMD

16th February 2024

Instructions: RUN PYSPARK and execute basic commands -Weekly activities will be marked

TASK1: Your first task is to follow at least one of the uploaded tutorials (either install Spark on your system or run on Colab).

In [1]:
```
#Running on Colab ( I was not able to install Spark on my System)
!pip install pyspark
!pip install -U -q PyDrive
!apt install openjdk-8-jdk-headless -qq
import os
os.environ['JAVA_HOME'] = '/usr/lib/jvm/java-8-openjdk-amd64'
```

```
Requirement already satisfied: pyspark in /usr/local/lib/python3.10/dist-packages (3.5.0)
Requirement already satisfied: py4j==0.10.9.7 in /usr/local/lib/python3.10/dist-packages (from pyspark) (0.1
0.9.7)
openjdk-8-jdk-headless is already the newest version (8u392-ga-1~22.04).
0 upgraded, 0 newly installed, 0 to remove and 33 not upgraded.
```

In [2]:
```
#  Import the libraries we will need
import pyspark
from pyspark.sql import *
from pyspark.sql.functions import *
from pyspark import SparkContext, SparkConf
```

In [3]:
```
# Create Spark session and ContextRun PySpark.
# create the session
conf = SparkConf().set("spark.ui.port","4050")
# create the context
sc = pyspark.SparkContext(conf=conf)
spark = SparkSession.builder.appName("DataFrame").config('spark.ui.port', '4050').getOrCreate()
```

In [4]:
```
spark
```

Out[4]:

SparkSession - in-memory

SparkContext

Spark UI (http://df0507599af1:4050)

Version

v3.5.0

Master

local[*]

AppName

pyspark-shell

TASK2: IN PYSPARK, open any text file and execute the following transformations and actions filter, map, flat map, count, saveasfile, collect. union, intersection, distinct, and difference commands learn in class.

UPLOAD your work here !!!

In [5]:
```
nums = sc.parallelize([1,2,3,4])
nums.collect()
```

Out[5]:
```
[1, 2, 3, 4]
```

In [6]:
```
inputfile = sc.textFile("input.txt")

print(inputfile.count()) #using count here
print(inputfile.first())
infile = inputfile.filter(lambda x: "and" in x) #using filter here
print(infile.count())

output1 = inputfile.map(lambda line: line.split(" ")).filter(lambda line: len(line)>5).collect() #using map & collect here
for output in output1:
  print(output)
```

```
6
and my name and aishaaa fastnuces
2
['and', 'my', 'name', 'and', 'aishaaa', 'fastnuces']
['why', 'there', 'when', 'how', 'this', 'that', '']
```

In [7]:
```
inputfile = sc.textFile("input.txt")
inputfile2=sc.textFile("input2.txt")

output1 = inputfile.union(inputfile2).collect() #using union here
for output in output1:
  print(output)
```

```
and my name and aishaaa fastnuces
what name was when
why there when how this that
this was here
and here
this is from a file
this is from file 2
this is from a file
```

In [8]:
```
inputfile = sc.textFile("input.txt")
inputfile2=sc.textFile("input2.txt")

output1 = inputfile.intersection(inputfile2).collect() #using intersection here
for output in output1:
  print(output)
```

```
this is from a file
```

In [9]:
```
numFile = sc.textFile("nums.txt")  #has 1,2,3,4,4,2

output1 = numFile.distinct().collect() #using distinct here
for output in output1:
  print(output)
```

```
1
4
2
3
```

In [10]:
```
numFile = sc.textFile("nums.txt")  #has 1,2,3,4,4,2
numFile2=sc.textFile("nums2.txt")  #has 1, 5, 7

output1 = numFile.subtract(numFile2).collect() #using subtract here
for output in output1:
  print(output)
```

```
2
2
3
4
4
```

In [11]:
```
numFile = sc.textFile("nums.txt")  #has 1,2,3,4,4,2

output1 = numFile.countByValue() #using countByValue here
print(output1)
```

```
defaultdict(<class 'int'>, {'1': 1, '2': 2, '3': 1, '4': 2})
```

In [12]:
```
numFile = sc.textFile("nums.txt")  #has 1,2,3,4,4,2

output1 = numFile.take(2) #using take here
print(output1)
```

```
['1', '2']
```

In [13]:
```
nums = sc.parallelize([1,2,3,4,4,2])

output1 = nums.reduce(lambda x, y: x+y) #using reduce here
print(output1)
```

```
16
```

In [14]:
```
numFile = sc.textFile("nums.txt")  #has 1,2,3,4,4,2
numFile2=sc.textFile("nums2.txt")  #has 1, 5, 7

output1 = numFile.cartesian(numFile2).collect() #using cartesian here
for output in output1:
  print(output)
```

```
('1', '1')
('1', '5')
('2', '1')
('2', '5')
('3', '1')
('3', '5')
('1', '7')
('2', '7')
('3', '7')
('4', '1')
('4', '5')
('4', '1')
('4', '5')
('2', '1')
('2', '5')
('4', '7')
('4', '7')
('2', '7')
```

In [15]:
```
numFile = sc.parallelize([[0,1],[0,1,2],[0,1,2,3]])

output1 = numFile.flatMap(lambda x:x).collect() #using flatmap here
for output in output1:
  print(output)
```

```
0
1
0
1
2
0
1
2
3
```

In [17]:
```
numFile = sc.parallelize([[0,1],[0,1,2],[0,1,2,3]])

output1 = numFile.saveAsTextFile('answerHERE.txt') #using savasfile here
```

TASK3: Explore the SPARKcluster UI (user-interface)

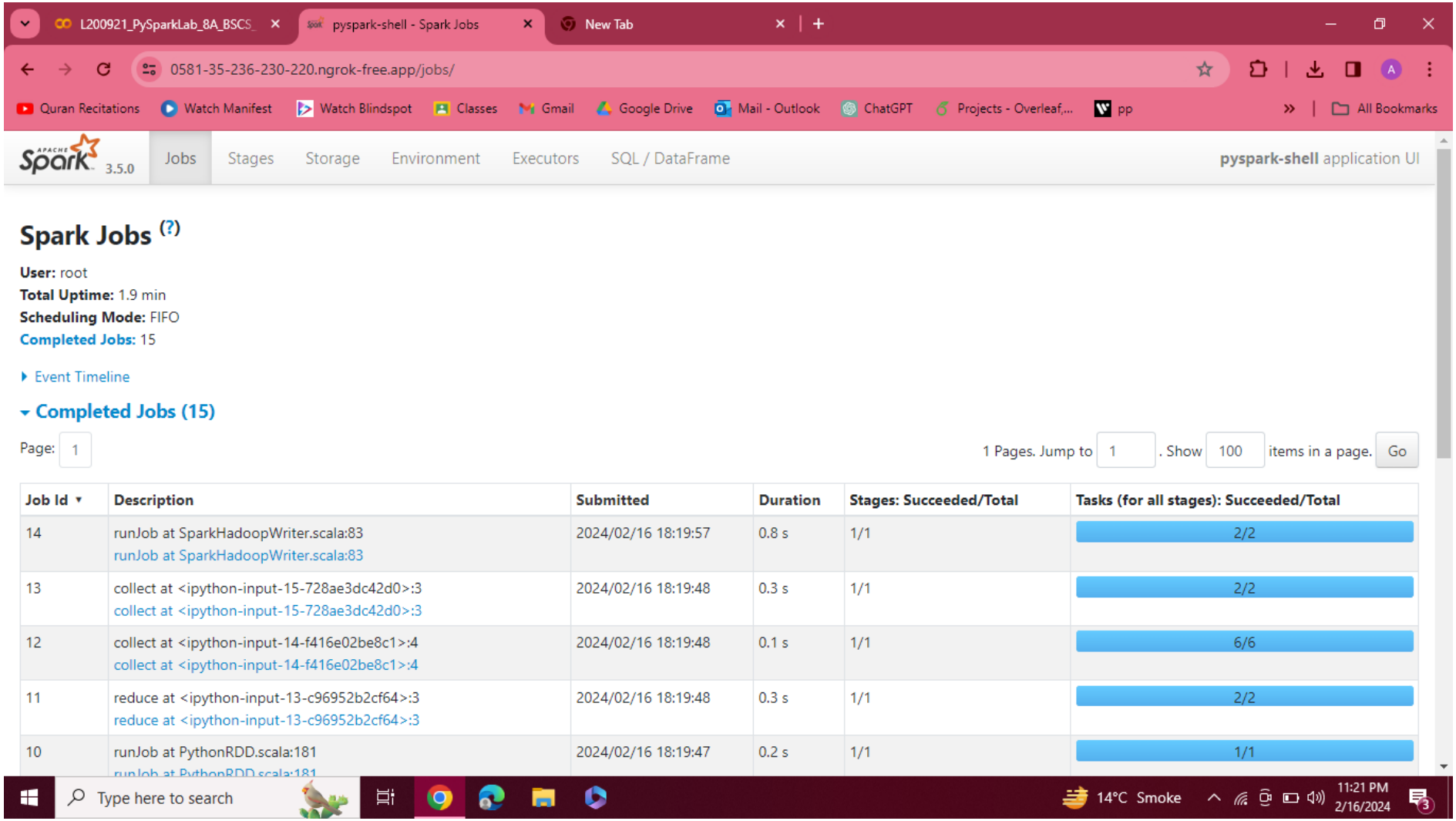
In [18]:
```
!pip install pyngrok
```

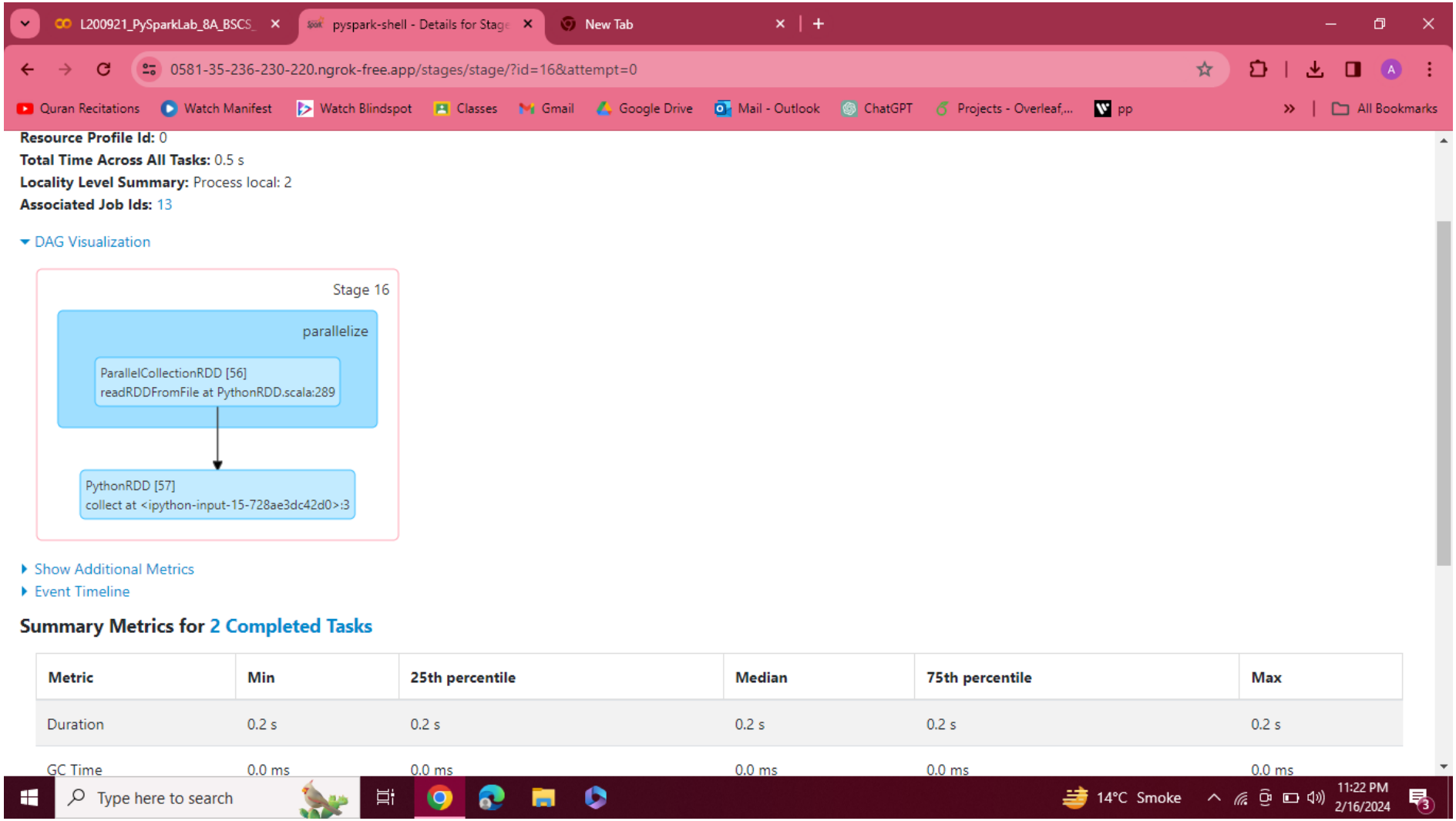
```
Requirement already satisfied: pyngrok in /usr/local/lib/python3.10/dist-packages (7.1.2)
Requirement already satisfied: PyYAML>=5.1 in /usr/local/lib/python3.10/dist-packages (from pyngrok) (6.0.1)
```

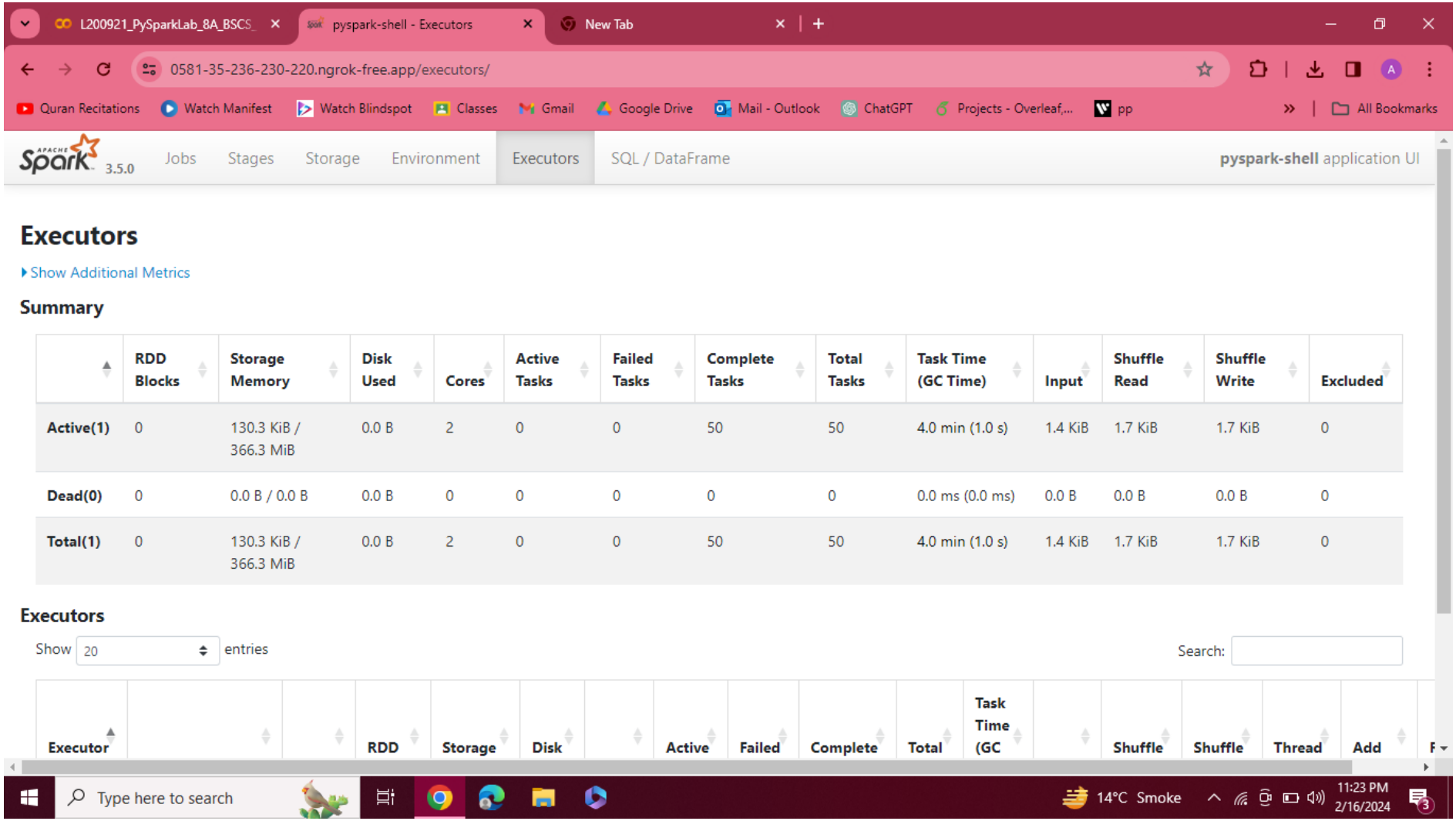
In [19]:
```
from pyngrok import ngrok, conf
import getpass

# Set Ngrok authtoken
print("Enter your authtoken, which can be copied from https://dashboard.ngrok.com/auth")
conf.get_default().auth_token = getpass.getpass()

# Define the port
ui_port = 4050

# Connect to Ngrok and get the public URL
try:
    public_url = ngrok.connect(ui_port).public_url
    print(f" * Ngrok tunnel created: {public_url} -> http://127.0.0.1:{ui_port}")
except Exception as e:
    print(f"Error creating Ngrok tunnel: {e}")

# My Authentication Token 2cSK5j3NB6McxNBPb9wFQQfF2MW_6njVGDJ7hkV1W6e9B7v9F
```

```
Enter your authtoken, which can be copied from https://dashboard.ngrok.com/auth
··········

WARNING:pyngrok.process.ngrok:t=2024-02-16T18:20:21+0000 lvl=warn msg="ngrok config file found at both XDG an
d legacy locations, using XDG location" xdg_path=/root/.config/ngrok/ngrok.yml legacy_path=/root/.ngrok2/ngro
k.yml

 * Ngrok tunnel created: https://0581-35-236-230-220.ngrok-free.app -> http://127.0.0.1:4050
```

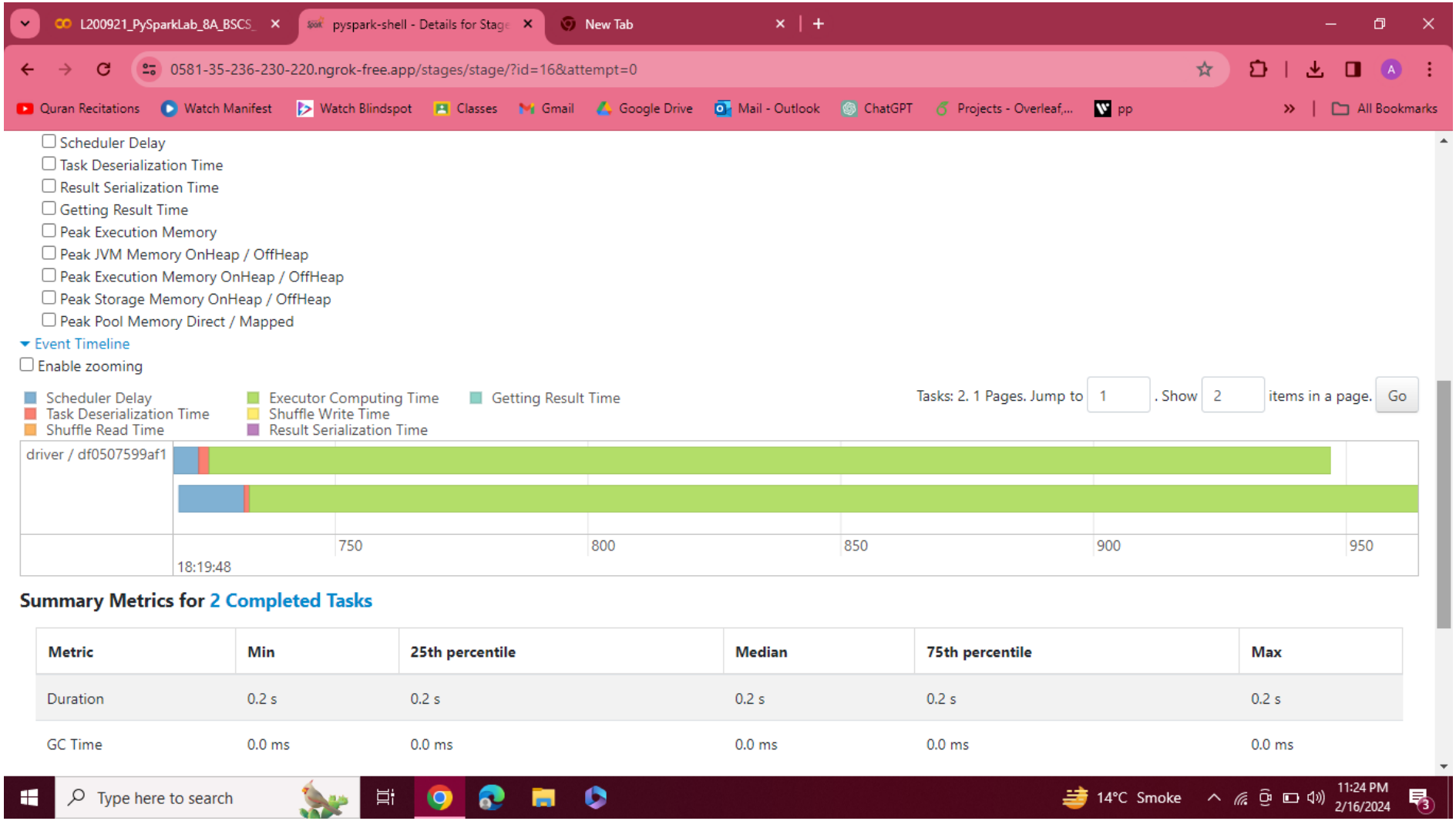
In [ ]:


L200921_PySparkLab_8A_BSCS_
pyspark-shell - Spark Jobs
New Tab
0581-35-236-230-220.ngrok-free.app/jobs/
Quran Recitations
Watch Manifest
Watch Blindspot
Classes
Gmail
Google Drive
Mail - Outlook
ChatGPT
Projects - Overleaf,...
pp
All Bookmarks
Spark 3.5.0
Jobs
Stages
Storage
Environment
Executors
SQL / DataFrame
pyspark-shell application UI
Spark Jobs (?)
User: root
Total Uptime: 1.9 min
Scheduling Mode: FIFO
Completed Jobs: 15
Event Timeline
Completed Jobs (15)
Page: 1
1 Pages. Jump to 1 . Show 100 items in a page. Go
Job Id
Description
Submitted
Duration
Stages: Succeeded/Total
Tasks (for all stages): Succeeded/Total
14
runJob at SparkHadoopWriter.scala:83
runJob at SparkHadoopWriter.scala:83
2024/02/16 18:19:57
0.8 s
1/1
2/2
13
collect at <ipython-input-15-728ae3dc42d0>:3
collect at <ipython-input-15-728ae3dc42d0>:3
2024/02/16 18:19:48
0.3 s
1/1
2/2
12
collect at <ipython-input-14-f416e02be8c1>:4
collect at <ipython-input-14-f416e02be8c1>:4
2024/02/16 18:19:48
0.1 s
1/1
6/6
11
reduce at <ipython-input-13-c96952b2cf64>:3
reduce at <ipython-input-13-c96952b2cf64>:3
2024/02/16 18:19:48
0.3 s
1/1
2/2
10
runJob at PythonRDD.scala:181
2024/02/16 18:19:47
0.2 s
1/1
1/1
Type here to search
14°C Smoke
11:21 PM
2/16/2024


L200921_PySparkLab_8A_BSCS_
pyspark-shell - Details for Stage
New Tab
0581-35-236-230-220.ngrok-free.app/stages/stage/?id=16&attempt=0
Quran Recitations
Watch Manifest
Watch Blindspot
Classes
Gmail
Google Drive
Mail - Outlook
ChatGPT
Projects - Overleaf,...
pp
All Bookmarks
Resource Profile Id: 0
Total Time Across All Tasks: 0.5 s
Locality Level Summary: Process local: 2
Associated Job Ids: 13
DAG Visualization
Stage 16
parallelize
ParallelCollectionRDD [56]
readRDDFromFile at PythonRDD.scala:289
PythonRDD [57]
collect at <ipython-input-15-728ae3dc42d0>:3
Show Additional Metrics
Event Timeline
Summary Metrics for 2 Completed Tasks
Metric
Min
25th percentile
Median
75th percentile
Max
Duration
0.2 s
0.2 s
0.2 s
0.2 s
0.2 s
GC Time
0.0 ms
0.0 ms
0.0 ms
0.0 ms
0.0 ms
Type here to search
14°C Smoke
11:22 PM
2/16/2024



	RDD Blocks	Storage Memory	Disk Used	Cores	Active Tasks	Failed Tasks	Complete Tasks	Total Tasks	Task Time (GC Time)	Input	Shuffle Read	Shuffle Write	Excluded
Active(1)	0	130.3 KiB / 366.3 MiB	0.0 B	2	0	0	50	50	4.0 min (1.0 s)	1.4 KiB	1.7 KiB	1.7 KiB	0
Dead(0)	0	0.0 B / 0.0 B	0.0 B	0	0	0	0	0	0.0 ms (0.0 ms)	0.0 B	0.0 B	0.0 B	0
Total(1)	0	130.3 KiB / 366.3 MiB	0.0 B	2	0	0	50	50	4.0 min (1.0 s)	1.4 KiB	1.7 KiB	1.7 KiB	0


L200921_PySparkLab_8A_BSCS_
pyspark-shell - Details for Stage
New Tab
0581-35-236-230-220.ngrok-free.app/stages/stage/?id=16&attempt=0
Quran Recitations
Watch Manifest
Watch Blindspot
Classes
Gmail
Google Drive
Mail - Outlook
ChatGPT
Projects - Overleaf,...
pp
All Bookmarks
Scheduler Delay
Task Deserialization Time
Result Serialization Time
Getting Result Time
Peak Execution Memory
Peak JVM Memory OnHeap / OffHeap
Peak Execution Memory OnHeap / OffHeap
Peak Storage Memory OnHeap / OffHeap
Peak Pool Memory Direct / Mapped
Event Timeline
Enable zooming
Scheduler Delay
Task Deserialization Time
Shuffle Read Time
Executor Computing Time
Shuffle Write Time
Result Serialization Time
Getting Result Time
Tasks: 2. 1 Pages. Jump to 1 . Show 2 items in a page. Go
driver / df0507599af1
750
800
850
900
950
18:19:48
Summary Metrics for 2 Completed Tasks
Metric
Min
25th percentile
Median
75th percentile
Max
Duration
0.2 s
0.2 s
0.2 s
0.2 s
0.2 s
GC Time
0.0 ms
0.0 ms
0.0 ms
0.0 ms
0.0 ms
Type here to search
14°C Smoke
11:24 PM
2/16/2024

In [ ]: