README

Date	@May 1, 2022
Tag	
Property	@April 30, 2022 10:28 PM

This is a submission of programming homework 2 by Hyo Won Kim (hk3175) and Alex Kita (ak4729).

Cluster Information to Prove Our Work

We used three clusters in total. To prove our work, we will list out three clusters name and the configuration below. (Please ignore the single node cluster stopped at this point. I took screenshots of them after task 2.)

- (type, name of cluster)
- (Single Node Cluster, cluster-d729)

Name	cluster-d729
Cluster UUID	e7690f3c-5a1e-4df6-a42e-0f58f70c52af
Type	Dataproc Cluster
Status	Stopped

MONITORING JOBS VM INSTANCES CONFIGURATION WEB INTERFACES

EDIT

Region	us-central1
Zone	us-central1-f
Autoscaling	Off
Dataproc Metastore	None
Scheduled deletion	Off
Master node	Single Node (1 master, 0 workers)
Machine type	n1-standard-4
Number of GPUs	0
Primary disk type	pd-standard
Primary disk size	500GB
Local SSDs	0
Secure Boot	Disabled
VTPM	Disabled
Integrity Monitoring	Disabled
Cloud Storage staging bucket	hw4_spark_ak
Network	default
Network tags	None
Internal IP only	No

- (3 node 2 workder cluster, cluster-35f7)

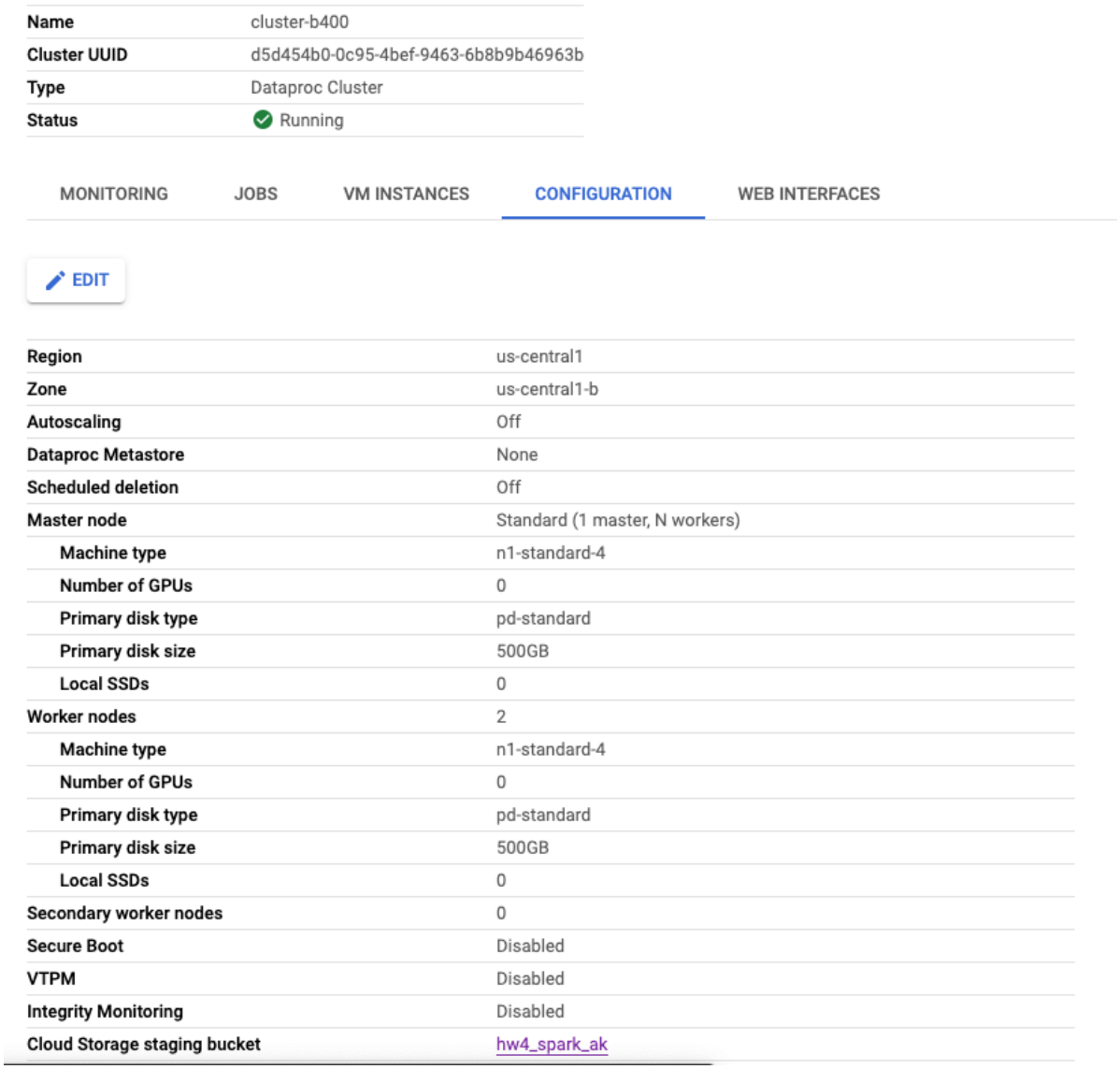
Name	cluster-35f7
Cluster UUID	3a086c00-ba10-4df5-a600-bfee48728014
Type	Dataproc Cluster
Status	Running

MONITORING JOBS VM INSTANCES CONFIGURATION WEB INTERFACES

EDIT

Region	us-central1
Zone	us-central1-c
Autoscaling	Off
Dataproc Metastore	None
Scheduled deletion	Off
Master node	Standard (1 master, N workers)
Machine type	n1-standard-4
Number of GPUs	0
Primary disk type	pd-standard
Primary disk size	500GB
Local SSDs	0
Worker nodes	2
Machine type	n1-standard-4
Number of GPUs	0
Primary disk type	pd-standard
Primary disk size	500GB
Local SSDs	0
Secondary worker nodes	0

- (3 node 2 workder cluster, cluster-b400)



Name	cluster-b400
Cluster UUID	d5d454b0-0c95-4bef-9463-6b8b9b46963b
Type	Dataproc Cluster
Status	Running

MONITORING JOBS VM INSTANCES CONFIGURATION WEB INTERFACES

EDIT

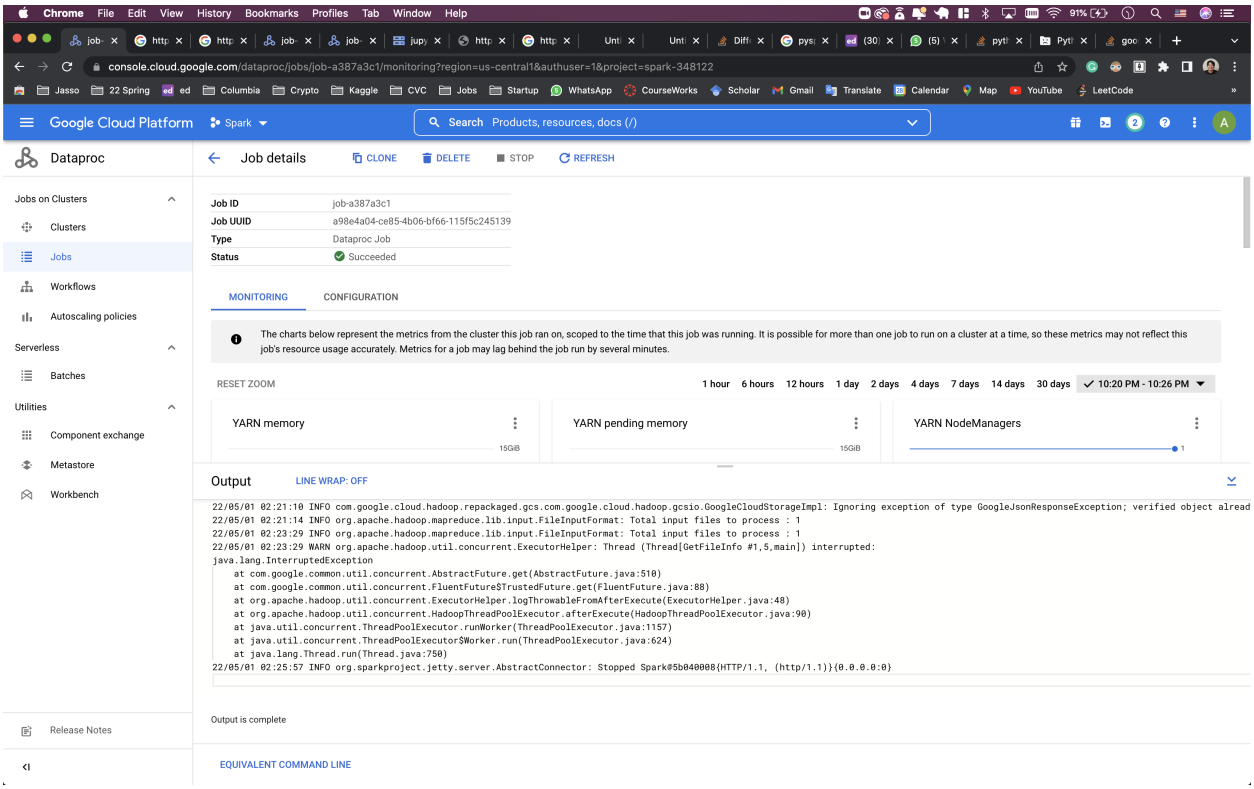
Region	us-central1
Zone	us-central1-b
Autoscaling	Off
Dataproc Metastore	None
Scheduled deletion	Off
Master node	Standard (1 master, N workers)
Machine type	n1-standard-4
Number of GPUs	0
Primary disk type	pd-standard
Primary disk size	500GB
Local SSDs	0
Worker nodes	2
Machine type	n1-standard-4
Number of GPUs	0
Primary disk type	pd-standard
Primary disk size	500GB
Local SSDs	0
Secondary worker nodes	0
Secure Boot	Disabled
VTPM	Disabled
Integrity Monitoring	Disabled
Cloud Storage staging bucket	hw4_spark_ak

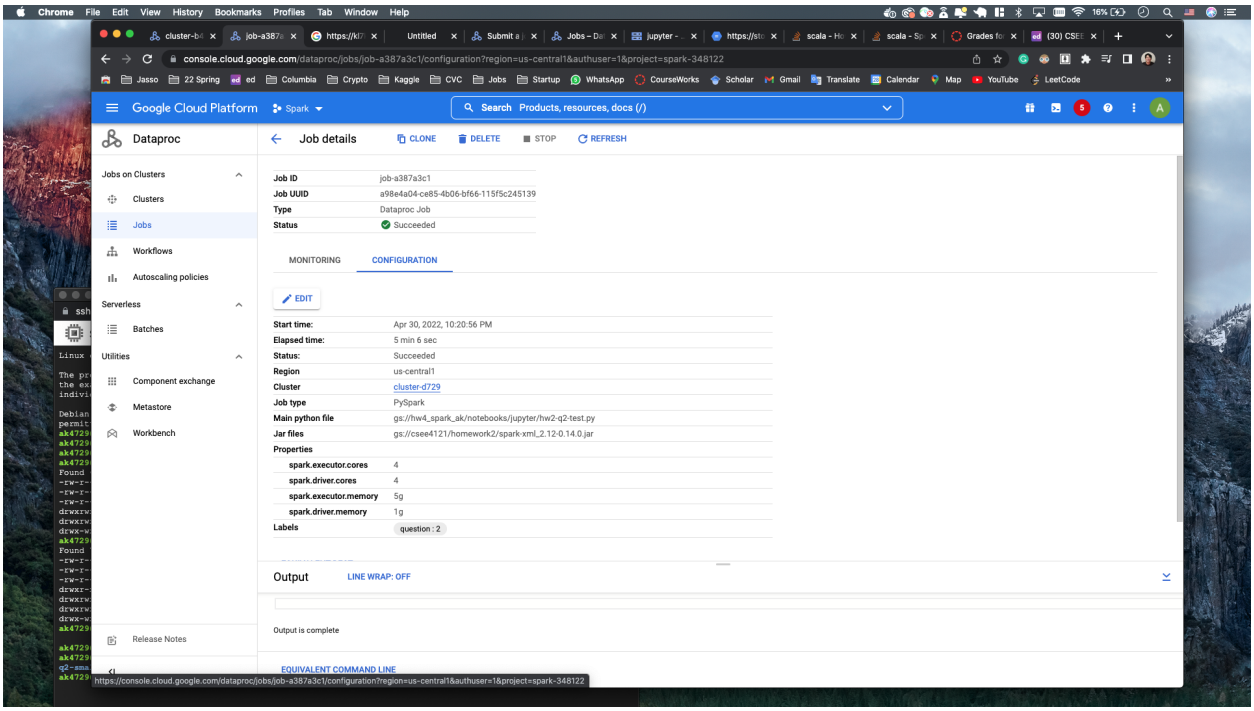
Question 1

The default block size of HDFS is 128 MB. The default replication factor is 2.

Question 2

completion time: 5 min 6 sec

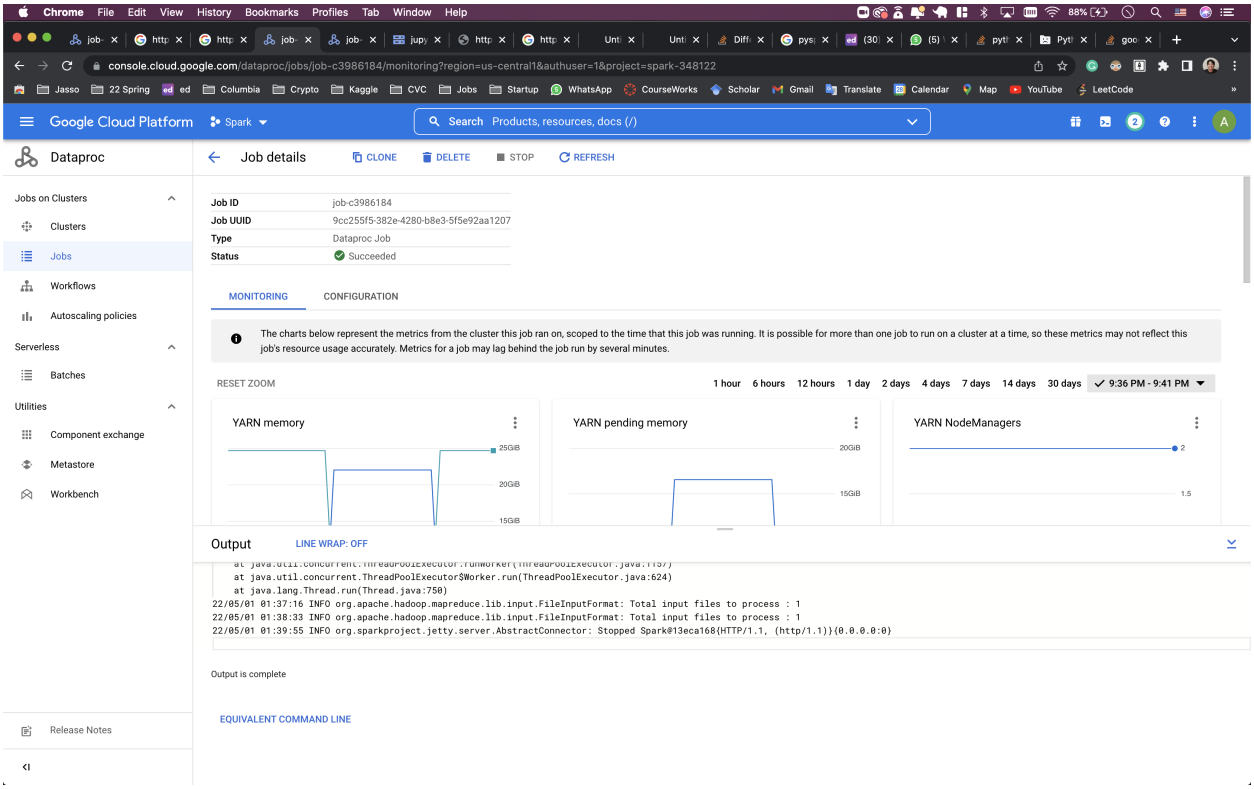


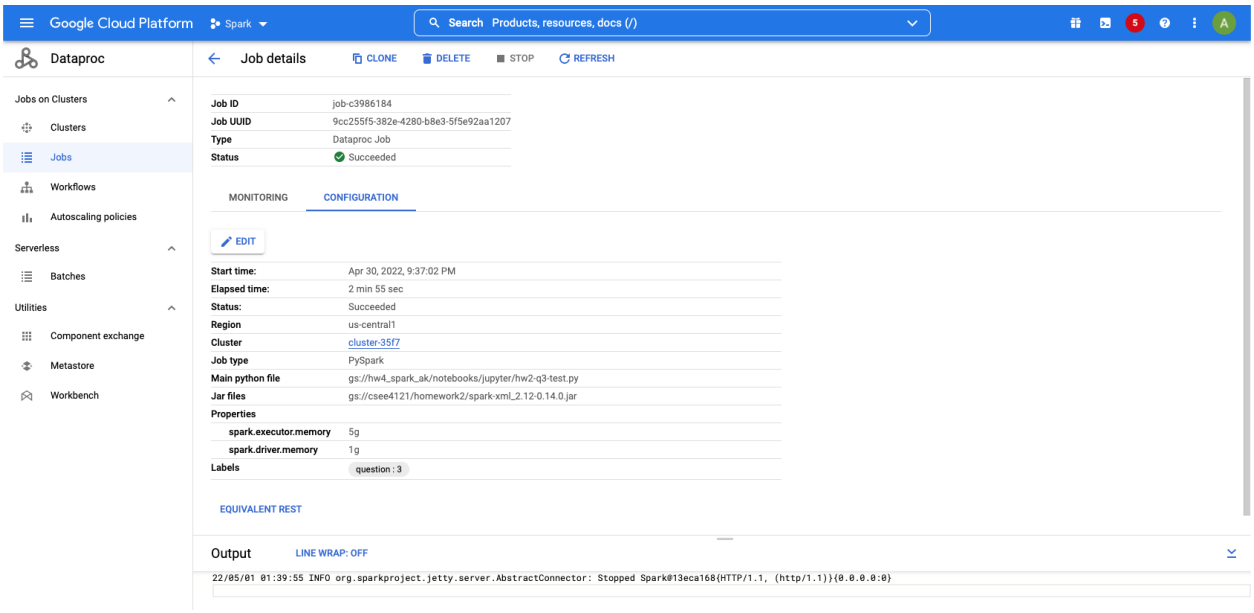


Question 3

completion time: 2 min 55 sec

The completion time is shorter than the single node cluster. That is because we have two worker node on top of one master so we can parallelize our tasks.

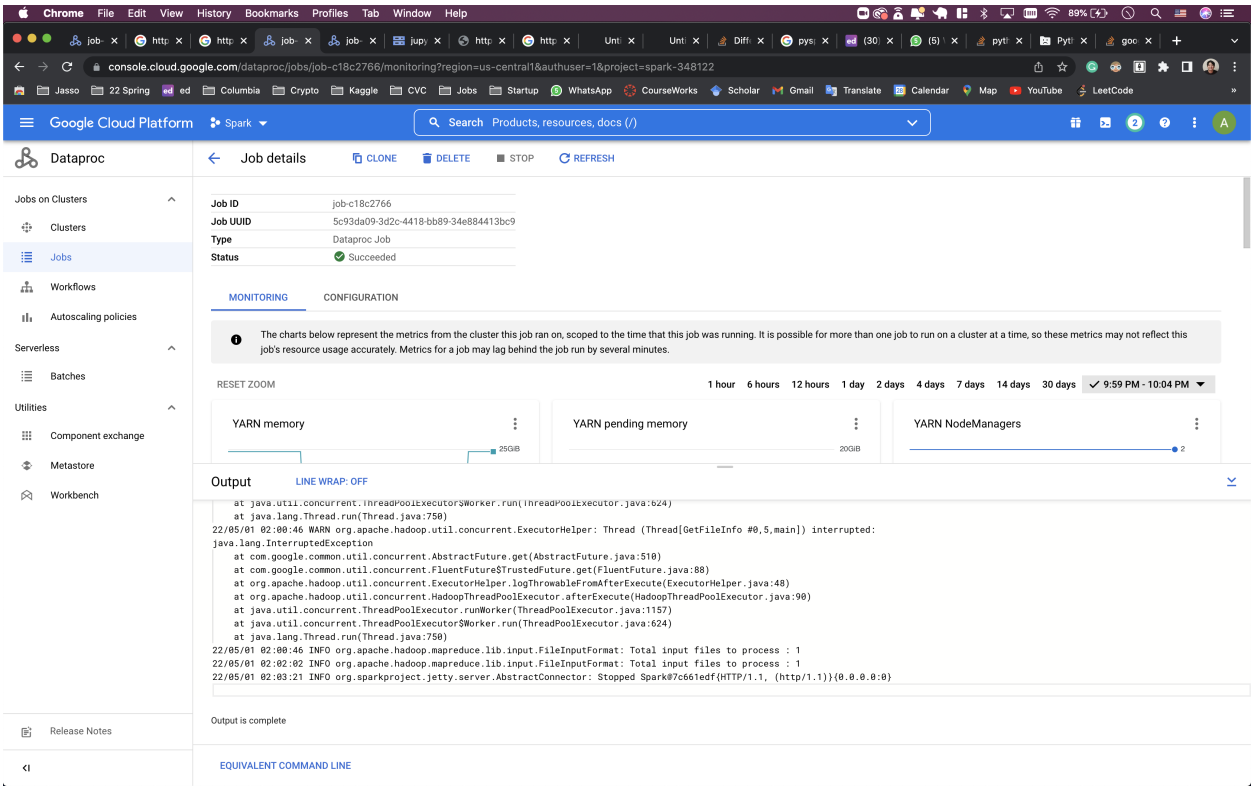


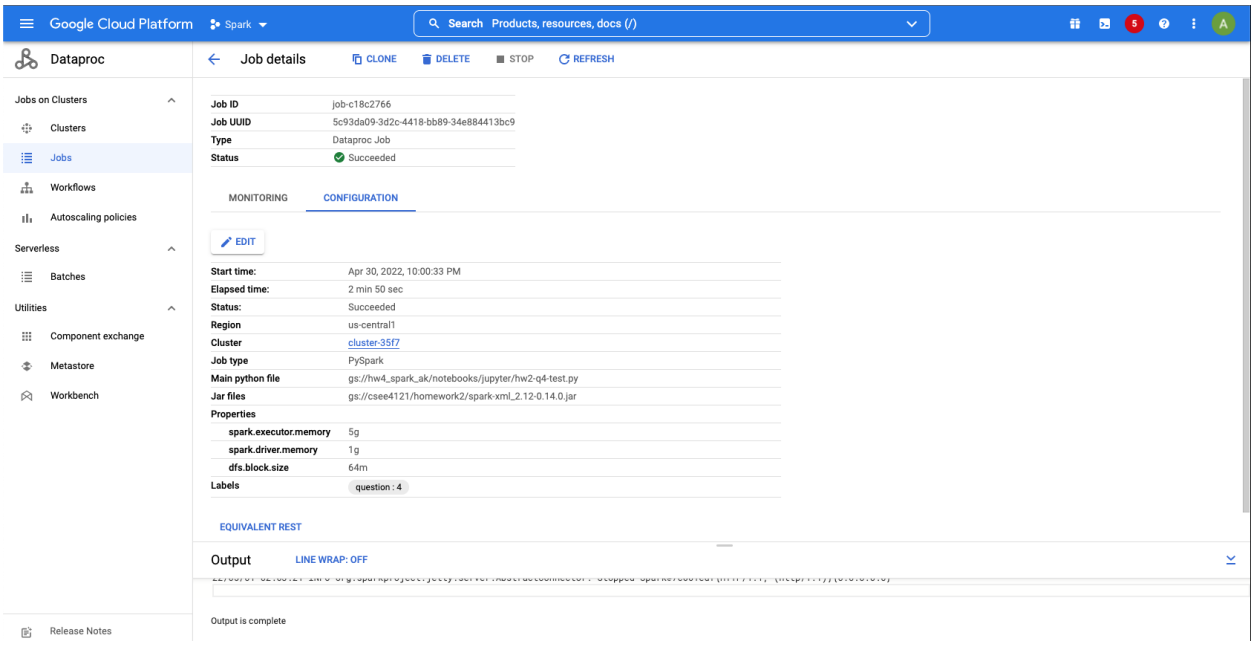


Question 4

completion time: 2 min 50 sec

The completion time is not too different from question 3 even though we change block size from 128MB to 64MB.

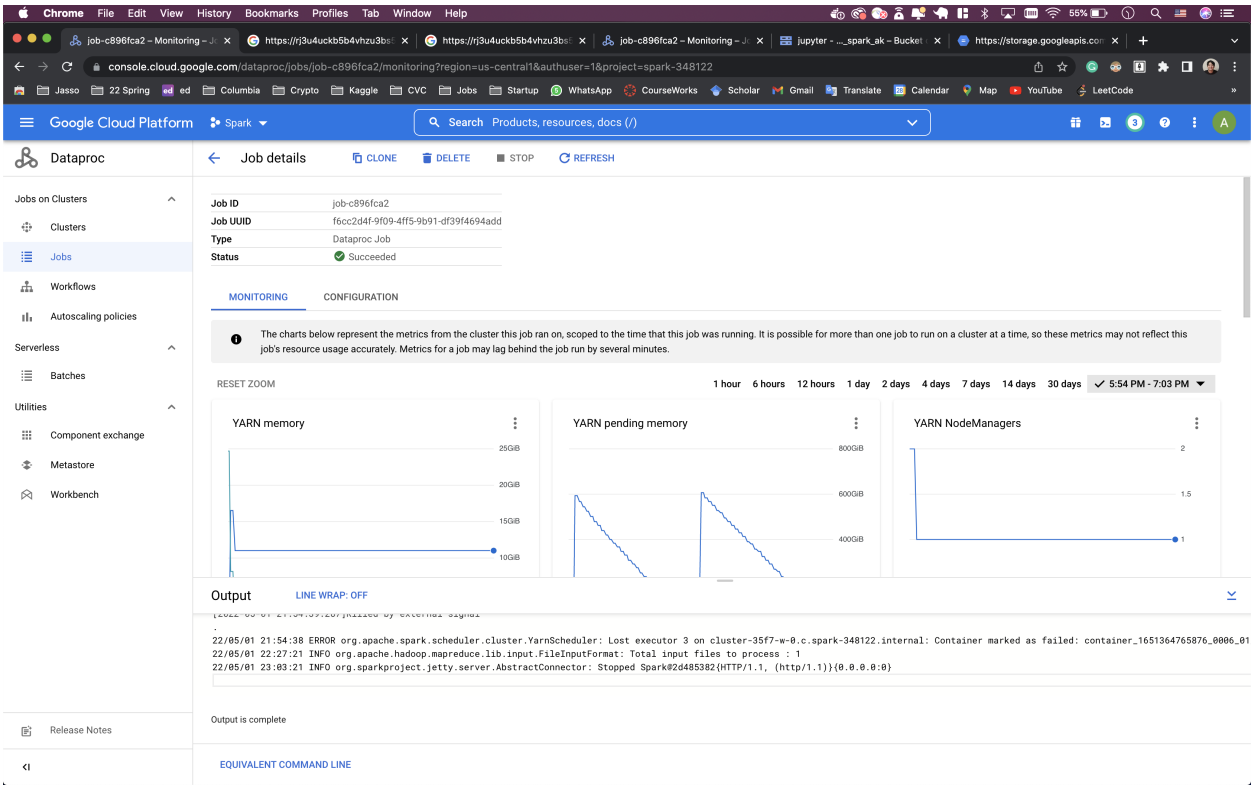


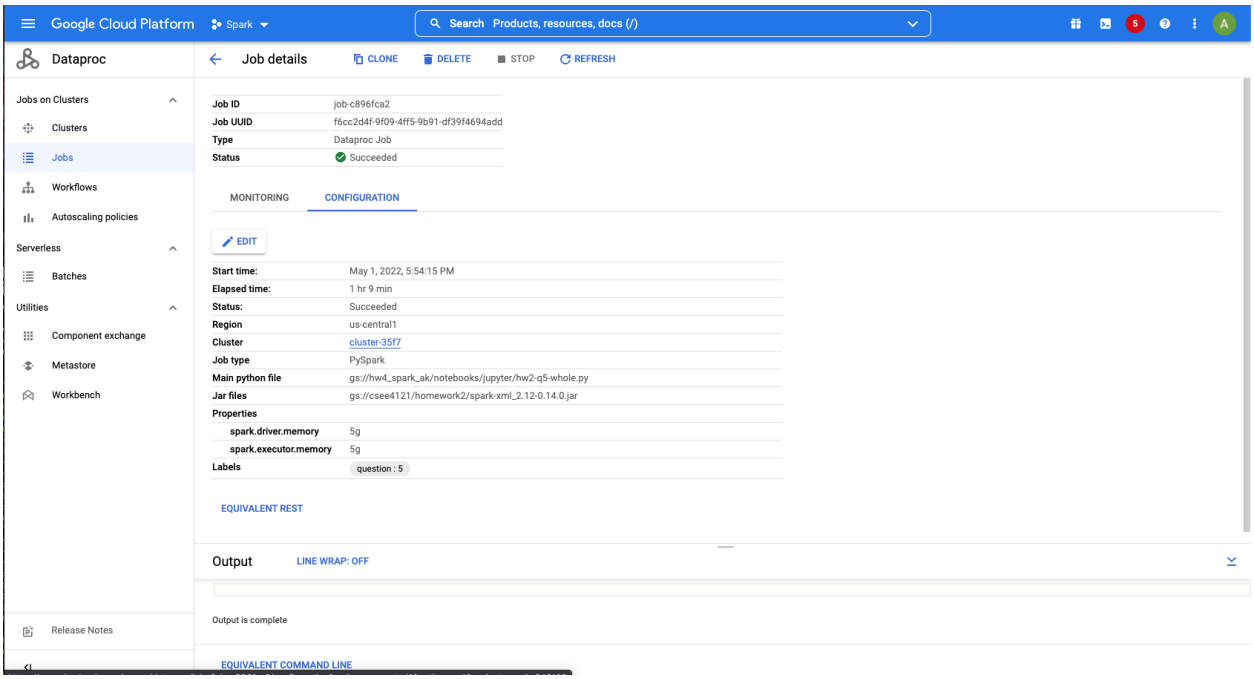


Question 5

Completion time: 1 hr 9 min

It still finished the job even though we kill one of the worker node. However, it took much longer than Question 6 or 7 which did not kill the worker node.

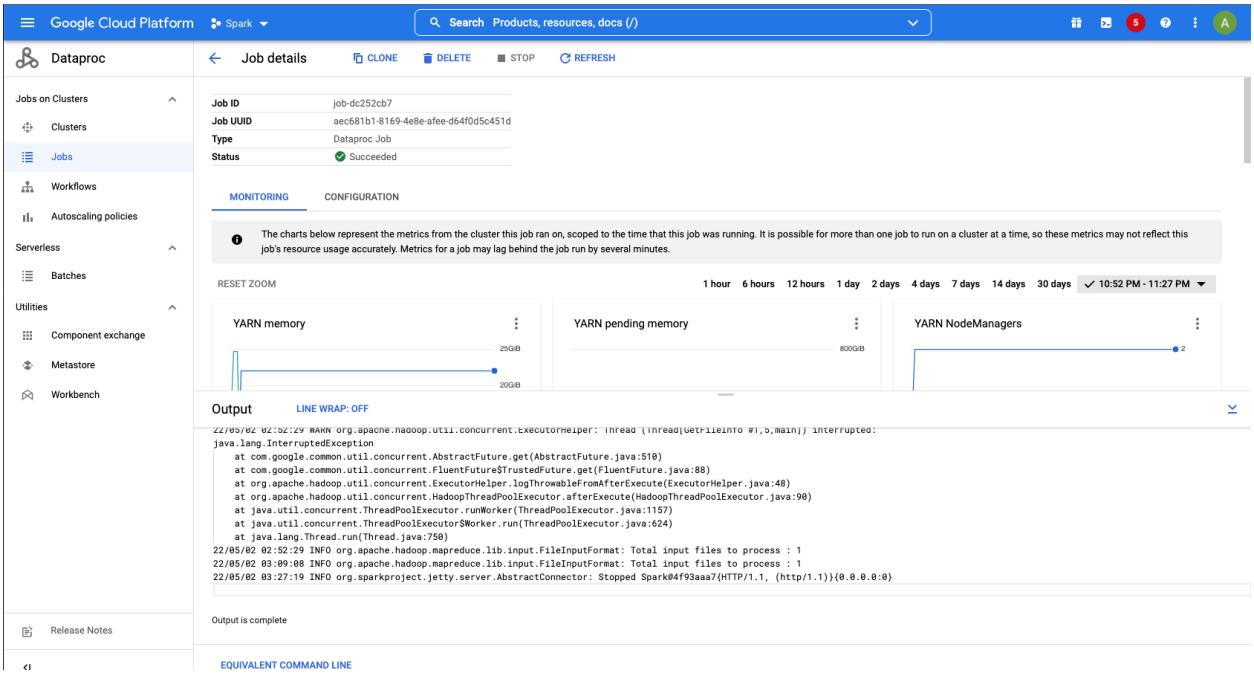

Google Cloud Platform
Spark
Search Products, resources, docs (/)
Dataproc
Job details
CLONE
DELETE
STOP
REFRESH
Jobs on Clusters
Clusters
Jobs
Workflows
Autoscaling policies
Serverless
Batches
Utilities
Component exchange
Metastore
Workbench
Release Notes
Job ID job-c896fca2
Job UUID f6cc2d4f-9f09-4ff5-9b91-df39f4694add
Type Dataproc Job
Status Succeeded
MONITORING
CONFIGURATION
The charts below represent the metrics from the cluster this job ran on, scoped to the time that this job was running. It is possible for more than one job to run on a cluster at a time, so these metrics may not reflect this job's resource usage accurately. Metrics for a job may lag behind the job run by several minutes.
RESET ZOOM
1 hour 6 hours 12 hours 1 day 2 days 4 days 7 days 14 days 30 days
5:54 PM - 7:03 PM
YARN memory
YARN pending memory
YARN NodeManagers
Output
LINE WRAP: OFF
22/05/01 21:54:38 ERROR org.apache.spark.scheduler.cluster.YarnScheduler: Lost executor 3 on cluster-35f7-w-0.c.spark-348122.internal: Container marked as failed: container_1651364765876_0006_01
22/05/01 22:27:21 INFO org.apache.hadoop.mapreduce.lib.input.FileInputFormat: Total input files to process : 1
22/05/01 23:03:21 INFO org.sparkproject.jetty.server.AbstractConnector: Stopped Spark@2d485382{HTTP/1.1, {http/1.1}}{0.0.0.0:0}
Output is complete
EQUIVALENT COMMAND LINE

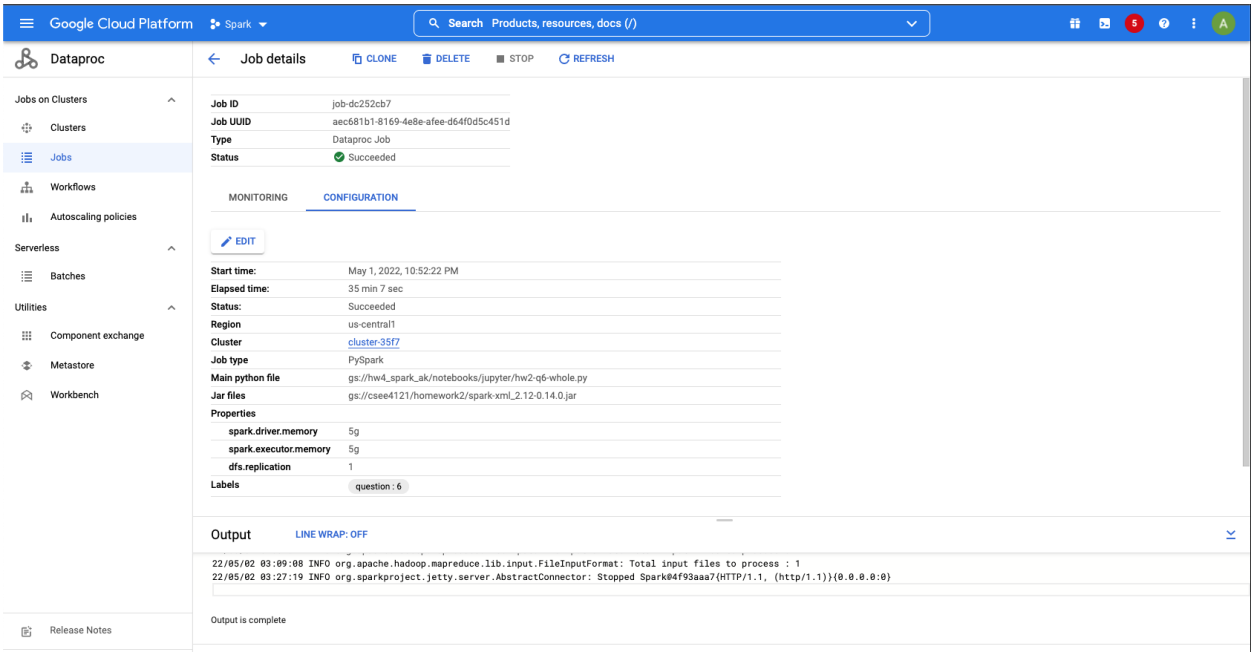

Google Cloud Platform
Spark
Search Products, resources, docs (/)
Dataproc
Job details
CLONE
DELETE
STOP
REFRESH
Jobs on Clusters
Clusters
Jobs
Workflows
Autoscaling policies
Serverless
Batches
Utilities
Component exchange
Metastore
Workbench
Release Notes
Job ID job-c896fca2
Job UUID f6cc2d4f-9f09-4ff5-9b91-df39f4694add
Type Dataproc Job
Status Succeeded
MONITORING
CONFIGURATION
EDIT
Start time: May 1, 2022, 5:54:15 PM
Elapsed time: 1 hr 9 min
Status: Succeeded
Region us-central1
Cluster cluster-35f7
Job type PySpark
Main python file gs://hw4_spark_ak/notebooks/jupyter/hw2-q5-whole.py
Jar files gs://csee4121/homework2/spark-xml_2.12-0.14.0.jar
Properties
spark.driver.memory 5g
spark.executor.memory 5g
Labels question : 5
EQUIVALENT REST
Output
LINE WRAP: OFF
Output is complete
EQUIVALENT COMMAND LINE

Question 6

Completion time: 35 min 7 sec

By not killing the worker node, it significantly improved the completion time. Changing replication factor to 1 does not affect the performance significantly.

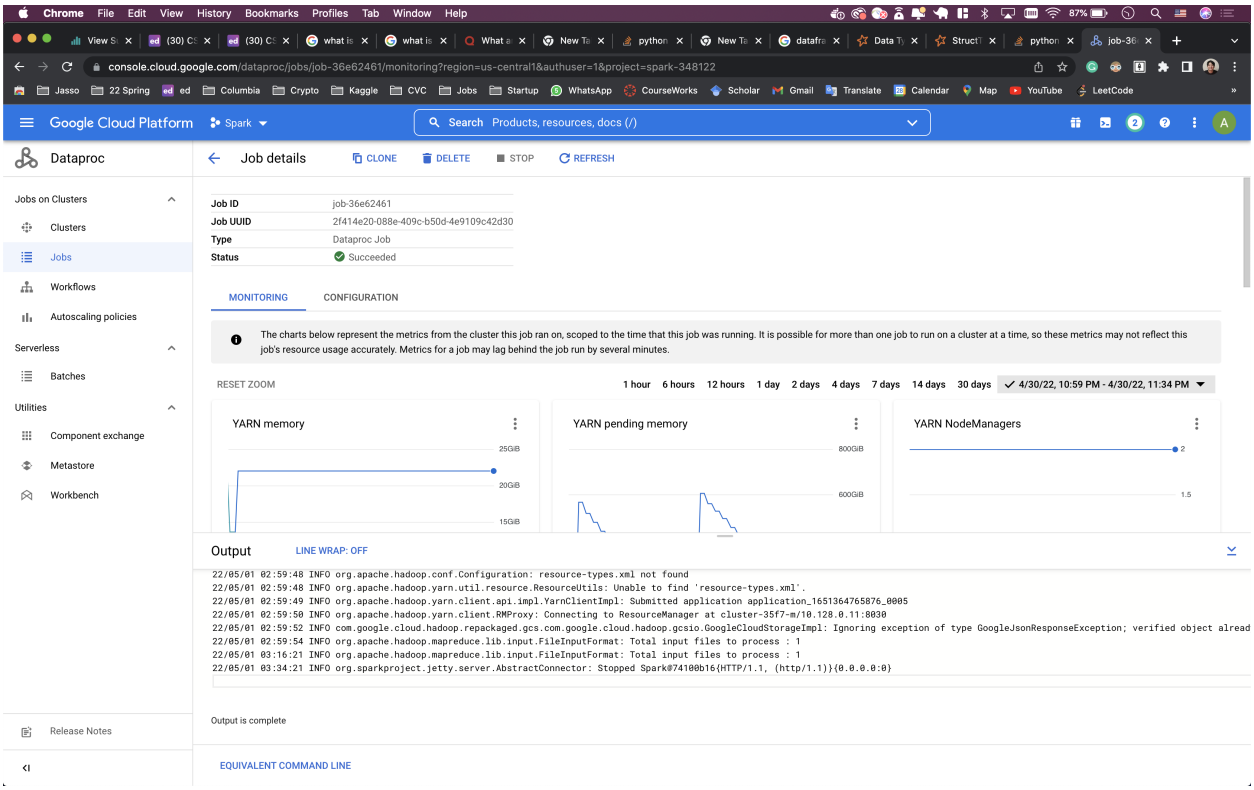


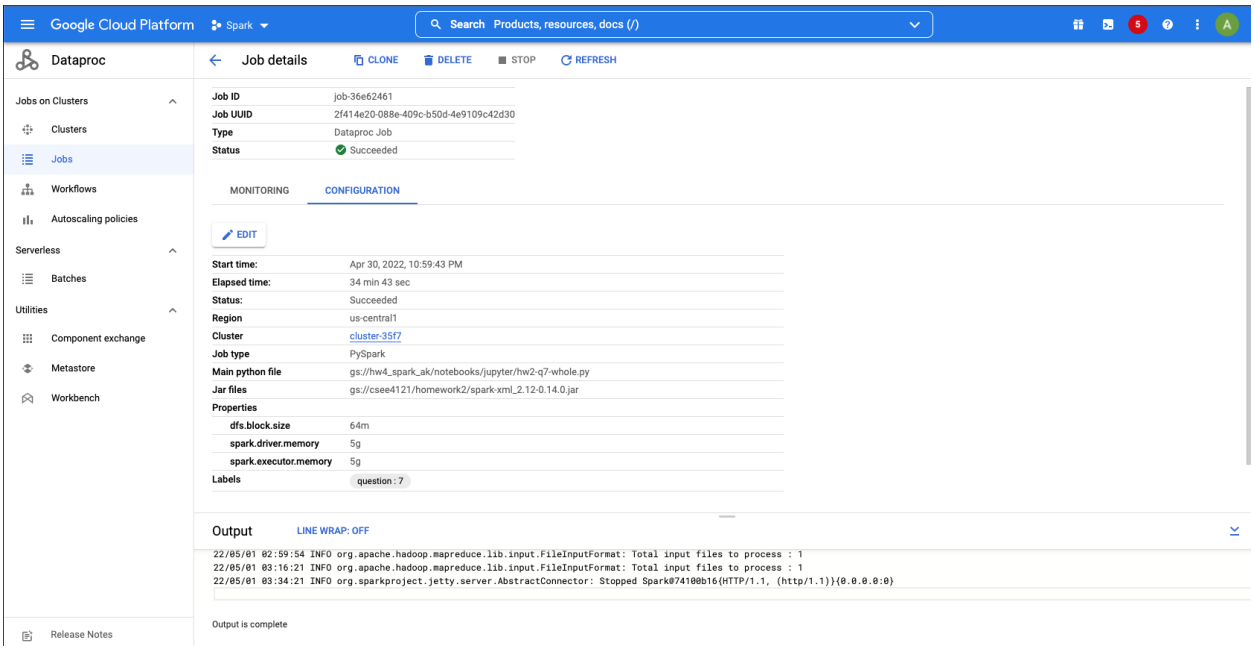


Question 7

Completion time: 34 min 43 sec.

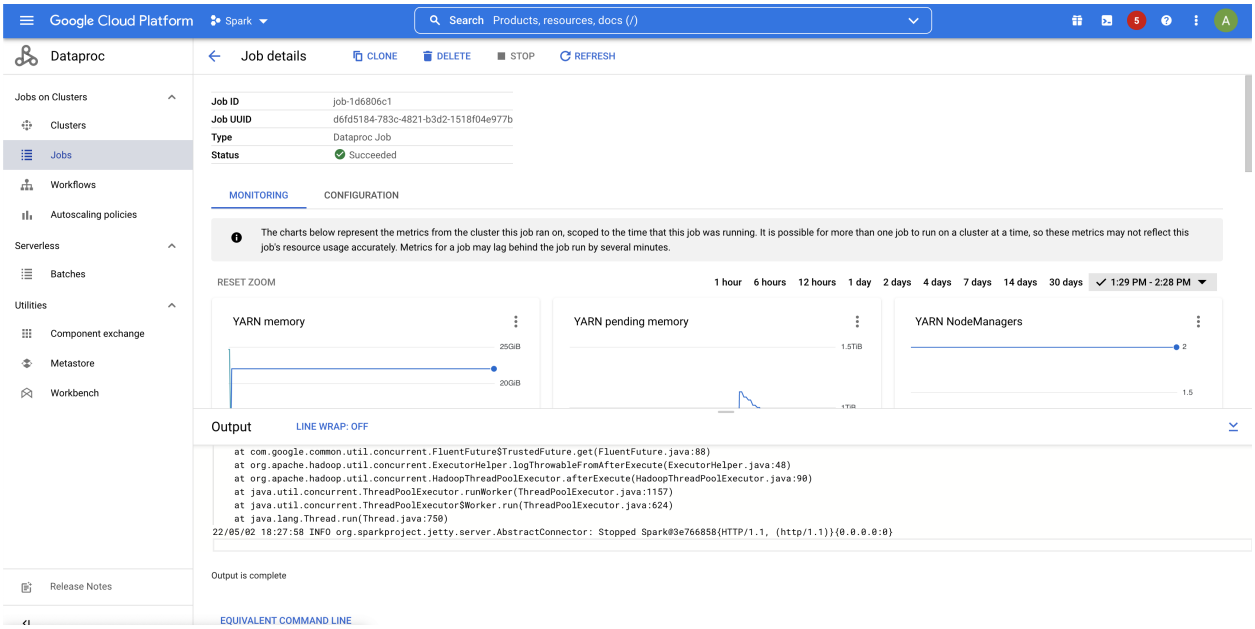
Even though we decrease the block size, we do not observe the worse the completion time. In fact, it got the better completion compared than Q5 and Q6.

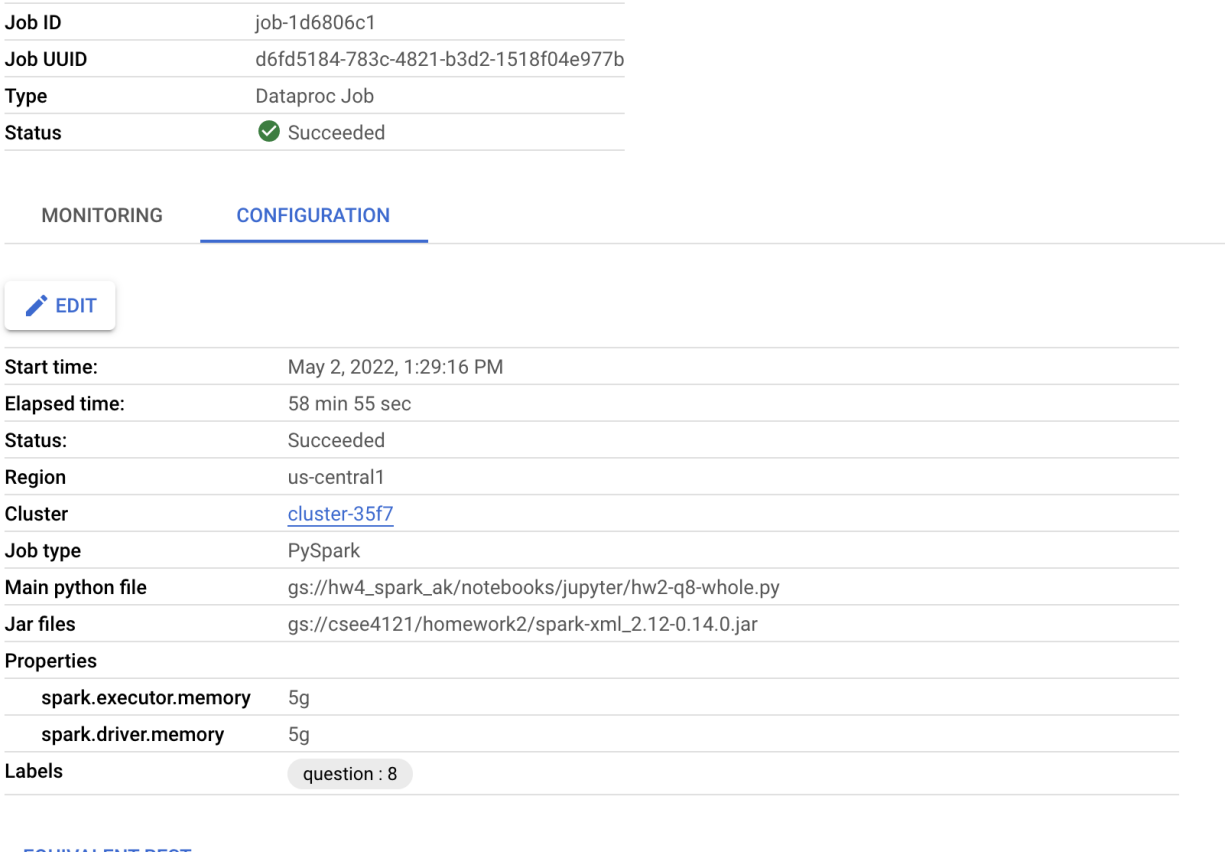




Question 8

Completion time: 58 min 55 sec





Job ID	job-1d6806c1
Job UUID	d6fd5184-783c-4821-b3d2-1518f04e977b
Type	Dataproc Job
Status	Succeeded

MONITORING CONFIGURATION

EDIT

Start time:	May 2, 2022, 1:29:16 PM
Elapsed time:	58 min 55 sec
Status:	Succeeded
Region	us-central1
Cluster	cluster-35f7
Job type	PySpark
Main python file	gs://hw4_spark_ak/notebooks/jupyter/hw2-q8-whole.py
Jar files	gs://csee4121/homework2/spark-xml_2.12-0.14.0.jar
Properties	
spark.executor.memory	5g
spark.driver.memory	5g
Labels	question : 8

Question 9

More than 1,148,000 articles in enwiki-whole.xml have a rank greater than 0.5.

Question 10

The data server design via TCP is feasible. This can be implemented using readStream.format(”socket”). In terms of efficiency, it can be inefficient for some aspects but efficient in other aspects. Because we have to wait for the socket connection request, the latency and the time to complete the task would be increased. However, once the socket connection is secured, it enables us to avoid writing and reading directly from the disk and we gain efficiency. For larger tasks, especially, data server design via TCP is much more efficient.

Question 11

We spent at least 30 hours on this assignment. Thank you for grading!