Neel Patel – nap48 CS643

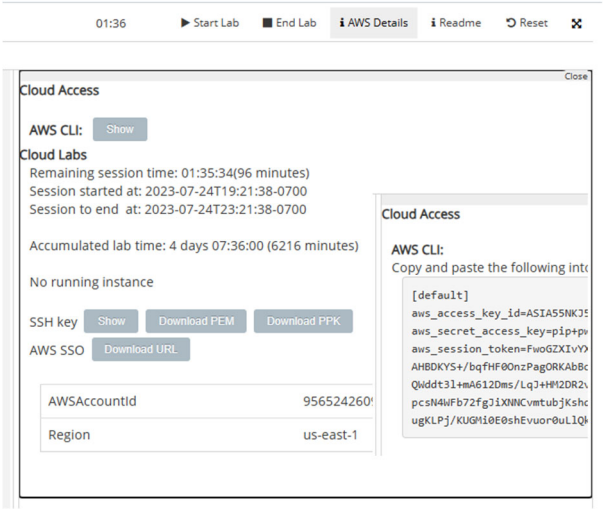
Project 2 Wine Quality Prediction - Readme

Code locations:

- Zip file submission on Canvas
- Github public repo: https://github.com/NeelAPatel/CS643-WinePrediction
- Dockerhub: (was not successful, the commands required to make a docker image are provided below)

Learner Lab setup

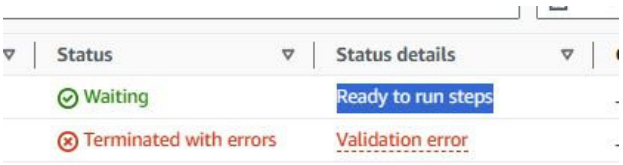
1. Open learner Lab and click [Start Lab]
2. Open [AWS Details] and save the AWS CLI keys as well as the PEM/PPK file to ssh into EC2 instances



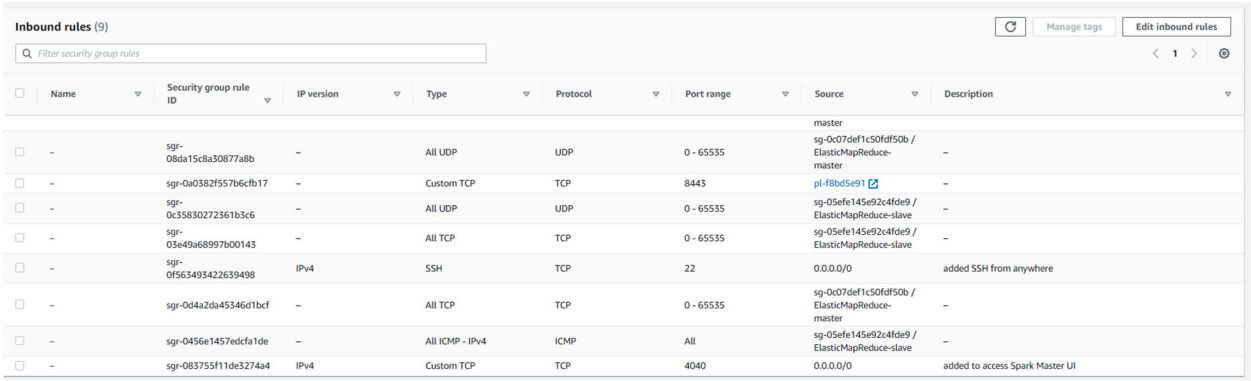
EMR instance creation

- Find out what exact server are you on (In my case us-east-1e)
  - Open AWS Cloud Shell (terminal inside aws website)
  - Run the following command, it will list you whatever instances are available to you at that point.
    - aws ec2 describe-instance-type-offerings --location-type "availability-zone" --filters Name=location,Values=**us-east-1e** --region **us-east-1** --query "InstanceTypeOfferings[*].[InstanceType]" --output text | sort
- Go to https://us-east-1.console.aws.amazon.com/emr/home?region=us-east-1#/clusters
- Create Cluster with following settings:
  - Name and Applications:
    - Ensure that the latest Amazon EMR release is selected
    - Spark
  - Cluster Configuration:
    - Primary, Core, and Task are all seet to c3.xlarge (worked for us-east-1e)

        - This instance type should be listed as part of your output from the earlier query. Might have to try different instances regardless.
    - Cluster Scaling and Provisioning:
        - Core = 1 ; Task = 3
    - Networking:
        - Open EC2 security groups firewall
        - Primary Node = ElasticMapReduce-Primary (or Create) (Might be called -Master later)
        - Core/Task nodes = ElasticMapReduce-Core (or Create) (Might be called -Slave or -Worker later)
    - Security configuration:
        - Amazon EC2 key pair: vockey
    - Identity and Access Management:
        - Service Role: EMR_DefaultRole
        - Instance Profile: EMR_EC2_DefaultRole
- This will create total 5 special EC2 instances for the cluster, wait until Status for cluster says Waiting and Status Details says Ready to run steps to proceed.



EMR Inbound port rules:

- Go to EC2 instances page --> Security Groups --> find the Master EMR rule
    - Add the following ports (22 and 4040) with the settings shown below:
    - 

Inbound rules (9)

Manage tags | Edit inbound rules

Filter security group rules

Name	Security group rule ID	IP version	Type	Protocol	Port range	Source	Description
						master	
–	sgr-08da15c8a30877a8b	–	All UDP	UDP	0 - 65535	sg-0c07def1c50fdf50b / ElasticMapReduce-master	–
–	sgr-0a0382f557b6cfb17	–	Custom TCP	TCP	8443	pl-f8bd5e91	–
–	sgr-0c35830272361b3c6	–	All UDP	UDP	0 - 65535	sg-05efe145e92c4fde9 / ElasticMapReduce-slave	–
–	sgr-03e49a68997b00143	–	All TCP	TCP	0 - 65535	sg-05efe145e92c4fde9 / ElasticMapReduce-slave	–
–	sgr-0f563493422639498	IPv4	SSH	TCP	22	0.0.0.0/0	added SSH from anywhere
–	sgr-0d4a2da45346d1bcf	–	All TCP	TCP	0 - 65535	sg-0c07def1c50fdf50b / ElasticMapReduce-master	–
–	sgr-0456e1457edcfa1de	–	All ICMP - IPv4	ICMP	All	sg-05efe145e92c4fde9 / ElasticMapReduce-slave	–
–	sgr-083755f11de3274a4	IPv4	Custom TCP	TCP	4040	0.0.0.0/0	added to access Spark Master UI

S3 location

- Search for S3 in the AWS site --> Create S3 bucket --> provide name --> Upload files
- Upload the TrainingDataset.csv and ValidationDataset.csv
- As part of code execution, the models will be saved in this bucket in the models/ directory.
    - Subsequent executions will overwrite the models in s3 appropriately.

Setting up EMR

- Open terminal and SSH into the Master node using ‘hadoop’ as the user and the PEM key
- Run the following commands:
    - *sudo yum update*
        - update all current packages

- *pip install pyspark findspark boto3 numpy pandas scikit-learn datetime*
  - install relevant packages for program
- *sudo yum install git -y*
  - install git to clone program
- *git version*
  - check git version
- *python -V*
  - check python version (if it doesn't exist, install it)

Developing on EMR instance (Visual Studio Code)

- Assuming Visual Studio Code is installed, Open the program and install the Remote-SSH extension.
- Click Bottom left Remote window button --> Connect to Host --> Add new SSH Host
  - Enter "ssh -i "<path to pem key>" hadoop@ec2<address>"
  - Edit the config file so the Path is accurate (Ctrl Shift P for menu)
- Once configured, open Remote Explorer Tab and connect to instance. You can now code and save files.

Copying/Running completed project code to EMR

- Assuming you are in the ~ directory..
- Run the following commands:
  - git clone https://github.com/neelapatel/CS643-WinePrediction
  - spark-submit –master yarn CS643-WinePrediction/WineTraining.py
  - spark-submit –master yarn CS643-WinePrediction/WineTesting.py
- Note: WineTraining.py will create models on the S3 bucket that will need to be deleted on subsequent runs, therefore it is best to use your OWN S3 bucket with TrainingDataset.csv and ValidationDataset.csv

Docker:

- *sudo service docker start*
- *cd CS643-WinePrediction*
- *touch Dockerfile*
- *nano Dockerfile*
  - add the required syntax, dockerfile included on github
- *sudo docker login*
- *sudo docker build -t neelapatel/cs643-wineprediction .*
- testing:
  - *sudo docker run -it neelapatel/cs643-wineprediction*
- push:
  - *sudo docker push neelapatel/cs643-wineprediction*

Code Execution Notes:

- The code runs assuming you are using the exact instructions documented in this readme.
- WineTraining and WineTesting.py will only use files stored in the neel-cs643 s3 bucket. If bucket does not exist, code will need to be modified with the appropriate changes, and MUST include the TrainingDataset.csv and ValidationDataset.csv