**AWS & GCP Virtual Machine Instance**

In this project, you will learn how to create Linux instance on AWS or GCP and how to tune the machine type to have enough computational power for the tasks. Since the goal is exploring the VM instance, you don’t need to worry about the coding part. A simple recommendation system will be built in Spark with ALS and all the codes will be provided.

Follow these steps to finish the project:

* You should already have credit on either AWS or GCP. If not, please check the links to [AWS](https://aws.amazon.com/grants/) or [GCP](https://google.secure.force.com/GCPEDU/?cid=bMRuFST8CuN9kpVlSPxFeVwJriHrE5VVsPoi2QCFkRFh81zIvYaSOeOtgvzUYhQy%2F) to apply the credits.
* Once you log in to the console of AWS or GCP, find the right places for the VM instance and create an instance with free or low charge:
  1. AWS: Go to Service 🡪 EC2 🡪 Launch Instance 🡪 Select “Ubuntu Server 16.04 LTS” 🡪 Select “t2.micro” (free tier eligible) 🡪 Review and Launch 🡪 Launch
  2. GCP: On the left menu bar, go to Compute Engine 🡪 VM instances 🡪 Create Instance 🡪 select the default one with 1vCPU and 3.75 GB memory 🡪 Create
* Launch the instance you just created. You may use the ssh in a terminal or a web page directly.
* Once you launch the instance, type in the following commands to set up the environment:

*sudo apt-get update*

*sudo apt-get install default-jre*

*sudo apt install python-minimal*

*sudo apt install python-pip*

*pip install numpy*

*wget http://archive.apache.org/dist/spark/spark-2.0.0/spark-2.0.0-bin-hadoop2.7.tgz*

*sudo tar -zxvf spark-2.0.0-bin-hadoop2.7.tgz*

*mv spark-2.0.0-bin-hadoop2.7 spark*

*wget* [*https://s3.amazonaws.com/cds-1/amazon-reviews-ratings.txt*](https://s3.amazonaws.com/cds-1/amazon-reviews-ratings.txt)

* Type in *“./spark/bin/pyspark”* and you will get into pyspark
* Train the mode with following code:

*from pyspark.mllib.recommendation import ALS, MatrixFactorizationModel, Rating*

*data = sc.textFile("amazon-reviews-ratings.txt")*

*ratings = data.map(lambda l: l.strip().encode("utf-8").split(',')).map(lambda l: Rating(int(l[1]), int(l[0]), float(l[2])))*

*#Setting up the parameters for ALS*

*rank = 5 # Latent Factors to be made*

*numIterations = 10 # Times to repeat process*

*#Create the model on the training data*

*model = ALS.train(ratings, rank, numIterations)*

* In the previous step, you will encounter an error after typing in the last line of the code. It is due to the low memory of the instance. So we need to tune the machine type:
  1. Stop the running instance
  2. Edit the machine type
     + GCP: Click on the instance name 🡪 Edit 🡪 Under Machine Type, select one configure with higher memory 🡪 Save
     + AWS: Right click on the instance name 🡪 Instance Settings 🡪 Change Instance Type 🡪 select one configure with higher memory 🡪 Apply
  3. Start the instance and try again
  4. Re-do 1-3 until the instance has enough memory to run the model
* You will need to recommend n movies to a user:

*# For User 196 Find 10 Products to Promote*

*model.recommendProducts(196,10)*

The submission:

* The screenshots of each step; for the screenshots of AWS or GCP console, please make sure to display your user name.
* Discuss which instance works for the computation and which do not work (the instance type and its configurations such as cpu and memory).

**NOTE**: It is very important that after finishing the project you must **STOP** or **DESTROY** the instance to avoid future charging.