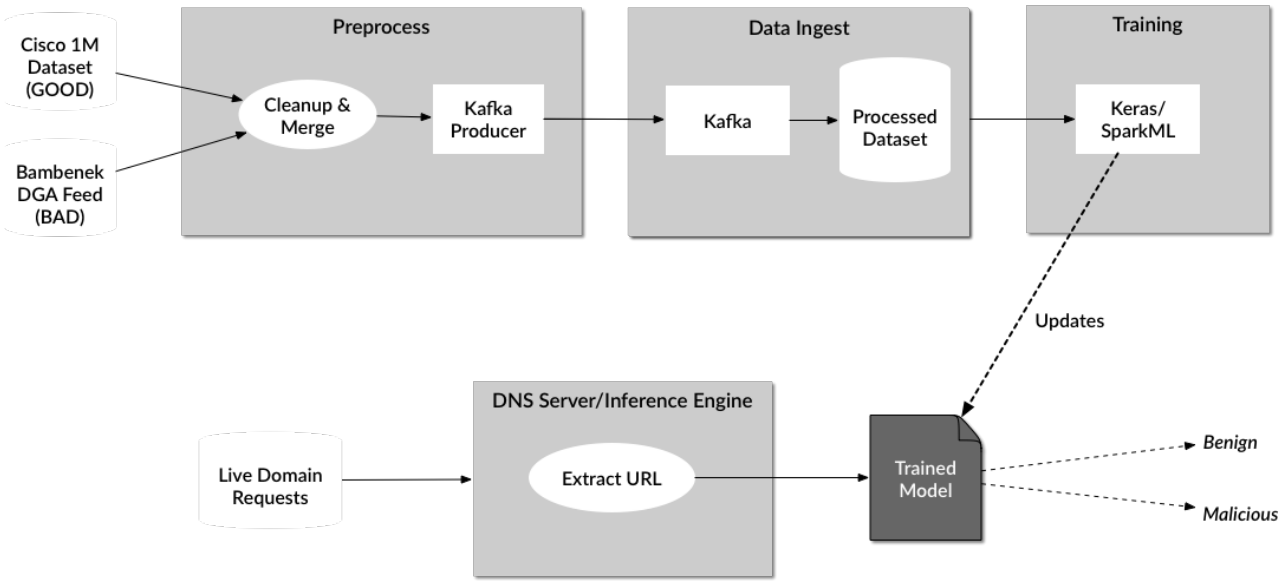
Setting up Environment in GCP

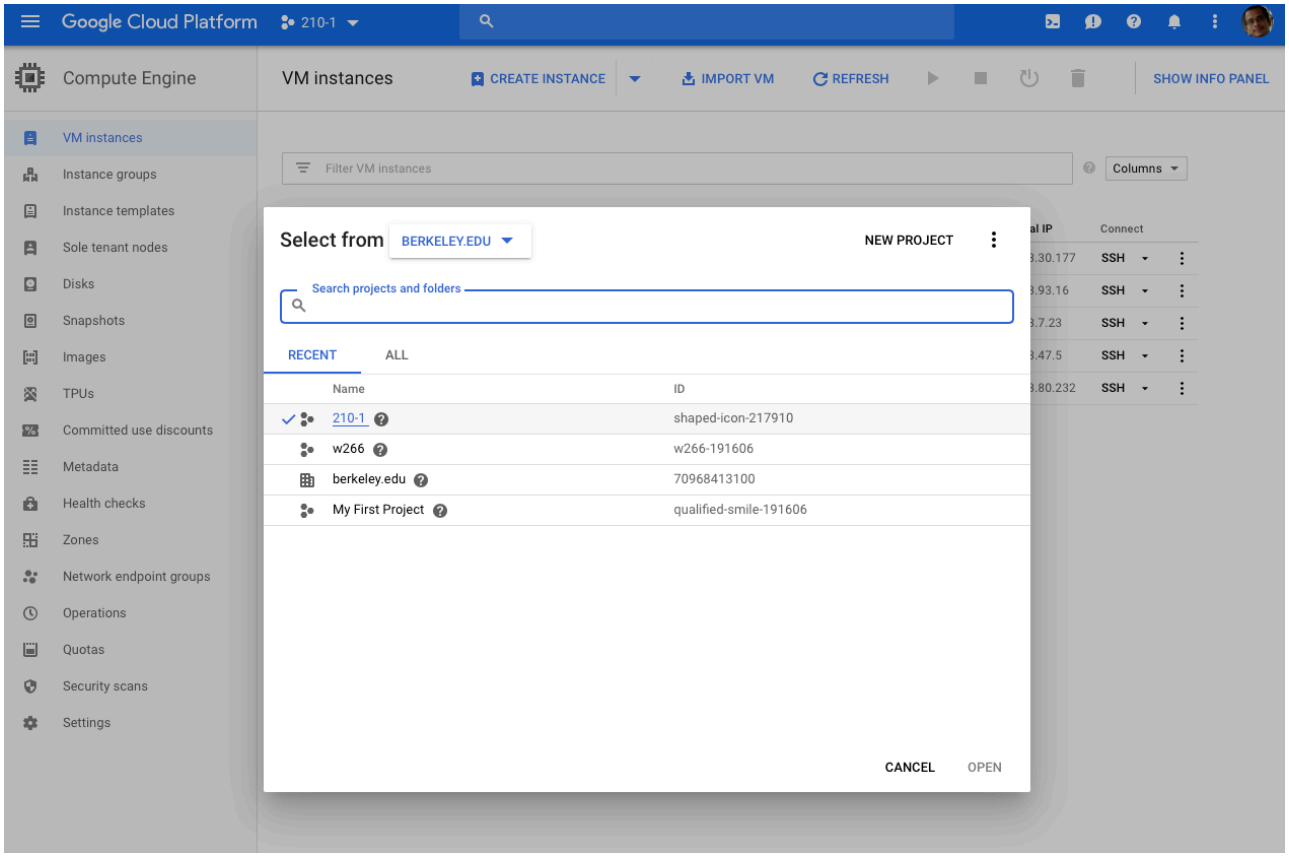
End Goal

To setup a distributed scalable environment on GCP for DGA Feed Training and Inference Engine that looks like this.



Prerequisites

- Setup GCP account
- Installed Google Cloud SDK on local machine (https://cloud.google.com/sdk/install)
- Created a project



Kubernetes setup

- On your browser go to kubernetes engine page and select the project (This will take several mins to start kubernetes engine)
  https://console.cloud.google.com/projectselector/kubernetes?_ga=2.201928657.-1707404544.1516051830

- While kubernetes engine gets ready, on your local machine, pull the docker images

```
$ docker pull confluentinc/cp-zookeeper:latest
$ docker pull confluentinc/cp-kafka:latest
$ docker pull midsw205/cdh-minimal:latest
$ docker pull midsw205/spark-python:0.0.5
$ docker pull midsw205/base:0.1.9
```

- Check the images

```
$ docker images
REPOSITORY                          TAG       IMAGE ID            CREATED             SIZE
confluentinc/cp-kafka               latest    373a4e31e02e        6 weeks ago         558MB
confluentinc/cp-zookeeper           latest    18b57832a1e2        4 months ago        562MB
midsw205/spark-python               latest    a554c3520502        6 months ago        3.87GB
midsw205/base                       latest    03fff049d97a        6 months ago        2.7GB
```

- Install kubectl

```
$ gcloud components install kubectl
```

- Tag the images to be pushed to GCP by using the image ids seen in the docker images output above.

```
$ docker tag a554c3520502 gcr.io/w210-1/spark-python
$ docker tag 03fff049d97a gcr.io/w210-1/mids
$ docker tag 373a4e31e02e gcr.io/w210-1/kafka
$ docker tag 18b57832a1e2 gcr.io/w210-1/zookeeper
```

- Push the tagged images to gcloud

```
$ gcloud docker --push gcr.io/w210-1/spark-python
$ gcloud docker --push gcr.io/w210-1/mids
$ gcloud docker --push gcr.io/w210-1/kafka
$ gcloud docker --push gcr.io/w210-1/zookeeper
```

- Create a cluster in gcloud

```
$ gcloud container clusters create kafka --num-nodes=5 --zone northamerica-northeast1-a
```

  This creates a cluster with 5 nodes below (5 nodes is the maximum in n1-standard-1 flavor). You can change the zone based on where you live.

- Check if the cluster is created and the computes are operational:

```
$ gcloud compute instances list
NAME                                    ZONE                        MACHINE_TYPE   PREEMPTIBLE  INTERNAL_IP
EXTERNAL_IP    STATUS
gke-kafka-default-pool-6a5787d6-299m  northamerica-northeast1-a  n1-standard-1              10.162.0.6
35.203.30.177  RUNNING
gke-kafka-default-pool-6a5787d6-4gl4  northamerica-northeast1-a  n1-standard-1              10.162.0.2
35.203.93.16   RUNNING
gke-kafka-default-pool-6a5787d6-l11c  northamerica-northeast1-a  n1-standard-1              10.162.0.4
35.203.7.23    RUNNING
gke-kafka-default-pool-6a5787d6-pwq6  northamerica-northeast1-a  n1-standard-1              10.162.0.5
35.203.47.5    RUNNING
gke-kafka-default-pool-6a5787d6-vczj  northamerica-northeast1-a  n1-standard-1              10.162.0.3
35.203.80.232  RUNNING
```

Deploying the containers

- We will use the following files in gcp directory

```
$ ls -1 *.yaml
kafka-deployment.yaml
kafka-service.yaml
mids-claim0-persistentvolumeclaim.yaml
mids-deployment.yaml
mids-service.yaml
myhdfs-deployment.yaml
myhdfs-service.yaml
myspark-deployment.yaml
myspark-service.yaml
zookeeper-deployment.yaml
zookeeper-service.yaml
```

- Use kubectl to bringup service and deployments

```
kubectl create --filename zookeeper-deployment.yaml
kubectl create --filename kafka-deployment.yaml
kubectl create --filename mids-deployment.yaml
kubectl create --filename myspark-deployment.yaml
kubectl create --filename zookeeper-service.yaml
kubectl create --filename kafka-service.yaml
kubectl create --filename mids-service.yaml
kubectl create --filename myspark-service.yaml
```

- Check if all the containers are deployed

```
$ kubectl get pods -o wide
NAME                         READY     STATUS    RESTARTS   AGE       IP          NODE
kafka-5c7bb56cbd-8ndmk       1/1       Running   0          4d        10.20.0.4   gke-kafka-default-pool-6a5787d6-
4gl4
mids-545f9676c-z2jvf         1/1       Running   0          4d        10.20.2.5   gke-kafka-default-pool-6a5787d6-
l11c
myspark-cd94d8765-vvdf8      1/1       Running   0          2m        10.20.1.7   gke-kafka-default-pool-6a5787d6-
pwq6
zookeeper-6cbcdd499f-wmsnq   1/1       Running   0          5d        10.20.1.5   gke-kafka-default-pool-6a5787d6-
pwq6
```

Verifying the message flow

- Login to the Kafka container

```
$ kubectl exec -it kafka-5c7bb56cbd-8ndmk bash
root@kafka-5c7bb56cbd-8ndmk:/#
```

- Create a topic 210test

```
root@kafka-5c7bb56cbd-8ndmk:/# kafka-topics --create --topic 210test --partitions 1 --replication-factor 1 --if-
not-exists --zookeeper zookeeper:32181
Created topic "210test".
root@kafka-5c7bb56cbd-8ndmk:/#
```

- Produce a random sequence and publish to the topic 210test

```
root@kafka-5c7bb56cbd-8ndmk:/# seq 42 | kafka-console-producer --request-required-acks 1 --broker-list
localhost:29092 --topic 210test
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
root@kafka-5c7bb56cbd-8ndmk:/#
```

- Login to the Spark container
- fetch messages through pyspark

```
$ kubectl exec -it myspark-cd94d8765-vvdf8 bash
root@myspark-cd94d8765-vvdf8:/spark-2.2.0-bin-hadoop2.6#
```

- Launch pyspark

```
root@myspark-cd94d8765-vvdf8:/spark-2.2.0-bin-hadoop2.6# pyspark
Python 3.6.1 |Anaconda custom (64-bit)| (default, May 11 2017, 13:09:58)
[GCC 4.4.7 20120313 (Red Hat 4.4.7-1)] on linux
:::: <Some ignorable warnings>
Welcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /__ / .__/\_,_/_/ /_/\_\   version 2.2.0
      /_/

Using Python version 3.6.1 (default, May 11 2017 13:09:58)
SparkSession available as 'spark'.
>>>
```

- Fetch messages from kafka with topic 210test

```
>>> numbers = spark \
... .read \
... .format("kafka") \
... .option("kafka.bootstrap.servers", "kafka:29092") \
... .option("subscribe","210test") \
... .option("startingOffsets", "earliest") \
... .option("endingOffsets", "latest") \
... .load()


>>> numbers.show()
+----+-------+-------+---------+------+--------------------+-------------+
| key|  value|  topic|partition|offset|           timestamp|timestampType|
+----+-------+-------+---------+------+--------------------+-------------+
|null|   [31]|210test|        0|     0|2018-10-07 19:31:...|            0|
|null|   [32]|210test|        0|     1|2018-10-07 19:31:...|            0|
|null|   [33]|210test|        0|     2|2018-10-07 19:31:...|            0|
|null|   [34]|210test|        0|     3|2018-10-07 19:31:...|            0|
|null|   [35]|210test|        0|     4|2018-10-07 19:31:...|            0|
|null|   [36]|210test|        0|     5|2018-10-07 19:31:...|            0|
|null|   [37]|210test|        0|     6|2018-10-07 19:31:...|            0|
|null|   [38]|210test|        0|     7|2018-10-07 19:31:...|            0|
|null|   [39]|210test|        0|     8|2018-10-07 19:31:...|            0|
|null|[31 30]|210test|        0|     9|2018-10-07 19:31:...|            0|
```

```
|null|[31 31]|210test|        0|    10|2018-10-07 19:31:...|            0|
|null|[31 32]|210test|        0|    11|2018-10-07 19:31:...|            0|
|null|[31 33]|210test|        0|    12|2018-10-07 19:31:...|            0|
|null|[31 34]|210test|        0|    13|2018-10-07 19:31:...|            0|
|null|[31 35]|210test|        0|    14|2018-10-07 19:31:...|            0|
|null|[31 36]|210test|        0|    15|2018-10-07 19:31:...|            0|
|null|[31 37]|210test|        0|    16|2018-10-07 19:31:...|            0|
|null|[31 38]|210test|        0|    17|2018-10-07 19:31:...|            0|
|null|[31 39]|210test|        0|    18|2018-10-07 19:31:...|            0|
|null|[32 30]|210test|        0|    19|2018-10-07 19:31:...|            0|
+----+-------+-------+---------+------+--------------------+-------------+
only showing top 20 rows
```

All Set!!!!

References:

- https://cloud.google.com/kubernetes-engine/docs/tutorials/hello-app https://kubernetes.io/docs/admin/cluster-large/

- Special thanks to Pavan Kurapati for publishing the original procedure during his 205, that helped me setup this.