Metropolitan State University
ICS 432 - 01: Distributed and Cloud Computing
Fall 2021

Lab 04: Elastic File System
Total points: 25
Out: Saturday, September 25, 2021
Due: 11:59 PM on Friday, October 1, 2021

Objective

The objective of this lab is to practice using Cloud File Systems.

Exercise 1: Working with Amazon **E**lastic **F**ile **S**ystem (Amazon EFS).
Exercise 2: Working with Google Cloud FileStore

References

AWS Elastic File System Developer Guide.
GCP Cloud Filestore Quickstart using the Console.

What to submit?

The objective of this lab is to practice using one type of cloud storage. To complete this lab:
- o Read this lab assignment carefully.
- o At various parts of the lab, you are asked to take screen shots of your work. Open a word document and paste the screen shots in this document in the same order as mentioned in the lab. Make sure to highlight the screen shot number.
- o After you complete all the lab exercises, upload the word document to the designated D2l folder by 11:59 PM on Friday, October 1, 2021.

NOTE: On Windows machines, you may consider using Snip & Sketch for screenshot handling.
NOTE: Make sure your screenshots are clear and the text inside the image is easily readable. You will lose the point for a screenshot if I cannot read what is written inside the screenshot.

Part 1: AWS Elastic File System (EFS)

1- Log in to your AWS Educate Account.
2- Open EFS console by going to Services → Storage → EFS
3- Choose Create file system to open the Create file system dialog box.
4- Enter a Name for your file system. Use your last name. For example, my EFS will be called GhanemLab4EFS.
5- For Virtual Private Cloud (VPC), keep it set to your default VPC.
6- There two options for **Availability and Durability**:
   a. **Regional** to create a file system that uses Standard storage classes. Standard storage classes store file system data and metadata redundantly across all Availability Zones within an AWS Region. Regional offers the highest levels of availability and durability.
   b. **One Zone** to create a file system that uses One Zone storage classes. One Zone storage classes store file system data and metadata redundantly within a single Availability Zone which makes it less expensive than Standard storage classes. Because EFS One Zone storage classes store data in a single AWS Availability Zone, data stored in these storage classes may be lost in the event of a disaster or other fault that affects all copies of the data within the Availability Zone, or in the event of Availability Zone destruction resulting from disasters, such as earthquakes and floods.

   For this lab, choose **One Zone** and leave the default setting for the zone. Make a note of the Availability Zone.
7- Note the following settings of the created file system.
   a. Automatic backups turned on
   b. General Purpose performance mode
   c. Bursting throughput mode –
   d. Encryption of data at rest enabled using your default key for Amazon EFS
   e. Lifecycle Management

Lab screenshot #1: take a screenshot of EFS console showing your created file system. Create and EFS.

8- Create and launch an EC2 instance. Make sure to do the following in the instance launch wizard:
   a. The instance should be in the same availability zone of the EFS.
   b. Use your last name in the instance name. For example, my instance name will be GhanemLab4Instance1.
   c. In Step 3 of instance launch wizard, in File Systems option, click on Add file system and choose the EFS that you just create. Note that the file system is mounted at `/mnt/efs/fs1`

File systems ⓘ   fs-8e74c83a | MyFirstFileSyst ⬍ /mnt/efs/fs1 ⊗
                  Add file system   ⟳ Create new file system
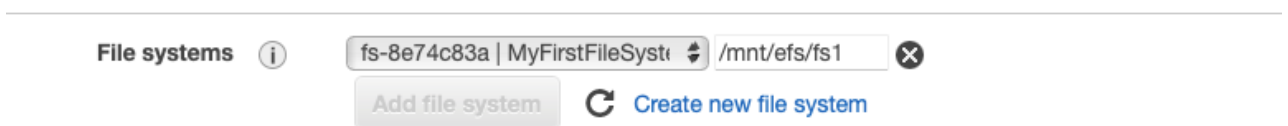
c. In security group, select an existing security group and choose default.

d. In key pair, create a new key pair called <mark><yourlastname>lab4efstinstance</mark> and download the key pair to your computer.

<mark>**Lab screenshot #2:** take a screenshot of EC2 dashboard showing your instance as running.</mark>
<mark>**Lab screenshot #3:** take a screenshot of the detailed of your instance showing the attached file system.</mark>

9- Establish an ssh connection to your instance.
10- Execute the following command to see the current mounts in the instance: `df -aTh`

<mark>**Lab screenshot #4:** take a screenshot of the output of the `df` command and note where the file system is mounted.</mark>

11- Use the cat command to create a file named <mark><your-last-name>-instance1-file.txt</mark>

```
cat > ghanem-instance1-file.txt
```

Enter ~2-3 sentences in the file then enter `ctrl-c` to save the file.

12- Execute `ls` command to make sure the file is created.
13- Execute cat command again to display the text in your file.

```
cat ghanem-instance1-file.txt
```

<mark>**Lab screenshot #5:** take a screenshot of the command window showing the text in your file.</mark>

14- Copy the file to EFS using cp as follows.

```
sudo cp ghanem-instance1-file.txt /mnt/efs/fs1
```

15- Make sure the file is successfully copied by displaying the file contents from the EFS folder/

```
ls /mnt/efs/fs1
cat /mnt/efs/fs1/ghanem-instance1-file.txt
```

<mark>**Lab screenshot #6:** take a screenshot of the command window showing the text in your file.</mark>

16- Launch another EC2 called <mark><your-last-name>Lab4Instance2</mark> and make sure of the following:
   a. attach the EFS system to the instance and take a note of its mount point.
   b. Use the same keypair that you used while creating the first instance.

17- Establish ssh connection to the second instance and us ls to check the files on the EFS folder. Repeat step 15 on the second instance to display the file.

18- From instance 2, create another text file, called <your-last-name>-instance2-file.txt and save it to the EFS.

19- Terminate the two EC2 instances.
20- Create a third EC2 instance and attach the EFS to it and make sure you still can access the two files that you creates on instance 1 and 2 even after the two instances are terminated.

21- Stop the third EC2 instance.

22- After you receive your grade for this lab, delete the EFS.

Part 2: GCP Cloud Filestore

In this exercise, you will create the virtual machine instance first, then create and attach the file system to a running instance. Note that the same scenario can be used to attach an AWS EFS to a running EC2 instance instead of attaching the file system at the instance creation time.

1- Log in to Google Cloud Platform Console using your Metro State email address.
2- Create a new project called, <your-last-name>Lab4Project.
3- From the main menu, click on Billing and make sure the 'Billing Account for Education' is selected.

4- Create a Virtual Machine with the following properties:
   a. Set **Name** to `<your-last-name>-nfs-client-1`
   b. Set **Zone** to **us-central1-a**.
   c. Set **Boot disk** to **Google Drawfork Debian GNU/Linux 9**.
   d. In the **Firewall** section, select the **Allow HTTP traffic** checkbox.
   e. Click **Create** to create the instance.

5- Create a Cloud Filestore instance as follows:
   a. From the main menu, choose Storage → Filestore
   b. If prompted, Enable Cloud Filestore API
   c. Click **Create Instance** and configure the instance as follows:
      i. Set **Instance ID** to `your-last-name-nfs-server`.
      ii. Set **Instance type** to **Basic**.
      iii. Set **Storage type** to **HDD**.
      iv. Set **Allocate capacity** to 1TB.
      v. Set **Region** to **us-central1** and **Zone** to **us-central1-a**.
      vi. Set **VPC network** to **default**.
      vii. Set **File share name** to vol1.
      viii. Set **Allocated IP range** to **Use an automatically allocated IP range**.
      ix. Set **Access controls** to **Grant access to all clients**.
      x. Click **Create**.

Lab screenshot #13: take a screenshot of the dashboard to show your running instance.

6- Mount the Filestore instance to the VM as follows:
   a. From the main menu, choose Compute Engine → VM instances
   b. In the list of VM instances, click the **SSH** button for your instance to open a terminal window connected to that instance.
   c. Install NFS by running the following commands:

```
sudo apt-get -y update
sudo apt-get -y install nfs-common
```

   d. Make a mount directory for the Filestore file share by running the following command:

```
sudo mkdir -p /mnt/<your-last-name>nfs
```

   e. Make sure the directory is created by running

```
sudo ls /mnt
```

Lab screenshot #14: take a screenshot of the command window showing the output of `ls`.

7- Mount the file share by running the mount command and specifying the Filestore instance IP address and file share name. You can get the `nfs-server` instance address from the Filestore instances page.

```
sudo mount 10.5.204.250:/vol1 /mnt/mynfs
```

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8- Make the file share accessible by changing the permissions:

```
sudo chmod go+rw /mnt/mynfs
```

9- Create a file on the file system by opening a terminal window that is connected to your nfs client instance, create a file named <your-last-name>-instance1-file.txt by running the following command:

```
cat > /mnt/mynfs/ghanem-instance1-file.txt
```

Write ~2-3 sentences in the file then enter **ctrl-c** to save the file.

10- Confirm that the file was created by running the following command:

```
cat /mnt/mynfs/ghanem-instance1-file.txt
```

11- Create another VM instance called `your-last-name-nfs-client-2` and mount the same file system to it. Make sure you can access the `ghanem-instance1-file.txt` from the second instance.

12 – Stop the two VM instances and the Filestore instance.