**Lab 7: Docker Volumes and Storage on AWS**

**Objective:**

**Implement persistent storage for Docker containers using AWS services.**

**Task:**

**- Deploy a Docker container that requires persistent storage.**

**- Integrate the container with Amazon EBS for storage.**

**Documentations:**

**Importance of Persistent Storage in Docker:**

Containers are ephemeral by nature, meaning they can be stopped, started, or destroyed without affecting the application's state. However, there are scenarios where you might want to persist data across container restarts or even share data among multiple containers. For such cases, Docker provides a mechanism called "volumes" to attach persistent storage to containers.

Using volumes, you can persist data generated by and used by Docker containers. This is crucial for stateful applications like databases, where data needs to be retained even after a container stops.

**Using Amazon EBS with Docker Containers:**

Amazon Elastic Block Store (EBS) provides block-level storage volumes that you can attach to Amazon EC2 instances. These can be used as persistent storage for Docker containers. By mounting an EBS volume to the directory where a Docker container stores its data, the data remains persistent across container restarts and terminations.

**Tasks:**

**Deploy a Docker container that requires persistent storage:**

1. Install Docker on your AWS EC2 instance (assuming you've already set up an EC2 instance):

| sudo apt-get update sudo apt-get install ca-certificates curl gnupg sudo install -m 0755 -d /etc/apt/keyrings curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg sudo chmod a+r /etc/apt/keyrings/docker.gpg |
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**1.2 Pull the Nginx image:**

| sudo docker pull nginx |
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**2. Integrate the container with Amazon EBS for storage:**

2.1 Create an EBS volume in AWS Management Console:

| -Open the Amazon EC2 console. -In the navigation pane, choose "Volumes" under "Elastic Block Store". -Choose "Create Volume". -Specify the volume type, size, and other required details. -After creation, note down the volume ID. |
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**2.2 Attach the EBS volume to your EC2 instance:**

| -In the Amazon EC2 console, select the created EBS volume. -Choose "Actions" and then "Attach Volume". -Select your EC2 instance and attach the volume. |
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**2.3 Attach the EBS volume to your EC2 instance:**

| -In the Amazon EC2 console, select the created EBS volume. -Choose "Actions" and then "Attach Volume". -Select your EC2 instance and attach the volume. |
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**2.4 SSH into your EC2 instance and prepare the EBS volume:**

| # Identify the new volume. Usually, it's /dev/xvdf, but it might differ. lsblk  # Assuming /dev/xvdf is the EBS volume, format it. sudo mkfs -t ext4 /dev/xvdf  # Create a mount point for the EBS volume. sudo mkdir /docker-lab  # Mount the EBS volume. sudo mount /dev/xvdf /docker-lab # Ensure the volume is remounted automatically after a reboot by updating /etc/fstab. echo '/dev/xvdf /docker-lab ext4 defaults,nofail 0 2' | sudo tee -a /etc/fstab |
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**2.5 Run the Nginx container using the mounted EBS volume:**

| sudo docker run --name nginx-container -v /docker-lab:/usr/share/nginx/html:rw -d -p 80:80 nginx |
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**2.6 Ensure the file permissions are correct:**

| sudo chown -R www-data:www-data /docker-lab |
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**2.7 Restart the Nginx container to make sure it picks up the changes:**

| sudo docker restart Container-ID |
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**Conclusion:**

With this lab, you have understood the importance of persistent storage in Docker and learned how to use Amazon EBS volumes as persistent storage for Docker containers. Remember, while EBS provides persistence, it's essential to back up your data regularly and monitor the health of the EBS volumes for optimal application performance.