Cloud Computing Exercise #3

Launch an EC2 instance with an elastic IP address and clone that instance from a custom AMI

Prerequisites:

* AWS account and a web browser
* PUTTY (or another SSH client) installed on your local machine.

A. Allocate an elastic IP address

1. Go to Network & Security/Elastic Ips after going to EC2 Dashboard (Search and click on EC2 in search bar), select “Allocate Elastic IP address”, and then “Allocate”.
2. Note the public EIP address that was allocated to you.

B. Create an EC2 instance and associate it with the EIP address

1. Go to the EC2 Dashboard and launch a new EC2 instance with the following parameters:
   * AMI: “Amazon Linux AMI” from Amazon Marketplace
   * Instance type: t2.micro
   * Storage: 8 GB of EBS. Make sure that the “Delete on Termination” checkbox is **NOT** checked so that the EBS volume would survive the instance termination
   * Tag: Tag name: “Name”, Tag value: “EIP instance 1”
   * Select “Allow HTTP traffic from the internet” in the Network Settings Section or alternatively edit in the Security group and add a new rule (type: HTTP, protocol: TCP, port range: 80, source: 0.0.0.0/0). This will allow the outside world (anyone) to access your instance using the HTTP protocol on port 80.
   * Use your existing key pair (or create a new one if needed)
2. Associate this instance with the EIP after creation: go to Network & Security/Elastic IPs, click on “Actions” and select “Associate Elastic IP address”. Select your running instance and its associated private IP address, and click on “Associate”. You should get a green message on the top of the screen confirming the IP association. Go back to the EC2 dashboard, select your running instance, look at the instance summary page and verify that the allocated public EIP address has become the public IP address of your instance.
3. Start a PUTTY session and log into your instance using the public EIP address.

C. Install and start a web server on the instance’s EBS volume

1. Install nano, a simple text editor, on your instance (type: sudo yum install nano or sudo get-apt install nano), and then launch it (type: nano). Type in some simple text (e.g. “Hello Linux world!”), save it (“CTRL + O” and give it a file name e.g. test.txt), and then exit nano (“CTRL + X”). Look at the current directory’s content (type: ls) and check that your file is there. You can also see its content by typing: cat <filename>.
2. Install the Apache HTTP web server on your instance (type: sudo yum install httpd), and then start the web server (type: sudo systemctl start httpd)
3. Open a new tab on your browser, and type the following into the address bar: http://<public IP>, where <public IP> is the public EIP of your instance. You should see your web server’s test page (“It Works…”). This means that you have successfully installed and started your web server, and you can reach it from the outside world.

D. Terminate your instance

1. Close the HTTP server’s browser window, go to your PUTTY window, stop the web server (type: sudo systemctl stop httpd) and close the SSH session. Terminate your instance and wait until its status becomes “Terminated”.
2. Go to Network & Security/Elastic IPs, and check the status of you EIP address. Verify that it has automatically become disassociated with you EC2 instance when it was terminated, the the EIP address is ready to be associated with a new instance.
3. Go to Elastic Block Store/Volumes and you should find your EBS volume there, showing that it has survived the instance termination.

E. Create an AMI from the EBS volume

1. Create a snapshot of the EBS volume: click on “Actions”, select “Create Snapshot”, enter a description (e.g. “EIP Instance 1 Snapshot”) and create the snapshot.
2. Go to Elastic Block Store/Snapshots and you should see the snapshot you have created.
3. Create an AMI from the snapshot: click on “Actions”, select “Create Image”, enter a name (e.g. “EIP Instance 1 Image”) and create the image.
4. Go to Image/AMIs and verify that your newly created image is there. (You can launch a new instance with this image directly from here, but we will now go through the “usual” steps of EC2 instance creation.)

F. Start a new instance

1. Go back to the EC2 instance list (Instances/Instances) and launch a new EC2 instance. When choosing an AMI, click on “My AMIs” and you should see your custom AMI by the name you created it with (e.g. “EIP Instance 1 Image”). Select that image, and from this point on, use exactly the same parameters as before (including the security group settings), except for a different tag: use a new Tag: Tag name: “Name”, Tag value: “EIP instance 2”. Note that the new instance will get a new EBS volume, which is created from the custom AMI image. Wait until your new instance starts up. (Note: you can launch as many instances from your custom AMI as you wish. This is how you can clone an EC2 instance’s root volume.)
2. Go to Network & Security/Elastic IPs and associate your public EIP address with the new EC2 instance. Go back to the EC2 dashboard, select your running instance, look at the instance summary page and verify that the same allocated public EIP address has become the public IP address of your instance.
3. Open a PUTTY terminal window and log into the new EC2 instance using the same public EIP address. Verify that this new instance has exactly the same software and data as the previously terminated instance. Check that the text file you created is in the user’s home directory (type: ls) and check that its content is identical (type: cat <file name>). Then start the web server that you installed on the previous instance (type: sudo systemctl start httpd). If you open a new browser tab and point your browser to your EIP address using
4. the HTTP protocol, you should see the HTTP server’s test page again (“It Works”). This means that you have successfully replaced your original (terminated) instance with its clone, which is reachable by the same public EIP address.

D. Clean up after yourself

1. Close your browser tab, stop your HTTP server and exit the SSH session.
2. Terminate the second EC2 instance, delete all EBS volumes (go to Elastic Block Store/Volumes and select Actions/Delete) and deallocate the EIP address (go to Network & Security/Elastic IPs and select Actions/Release Elastic IP Address). Deregister your custom AMI (go to Images/AMIs and select Actions/Deregister) and delete the EBS volume snapshot (go to Elastic Block Store/Snapshots and select Actions/Delete). Note that your custom AMI depends on the snapshot, so you cannot delete the snapshot without deregistering the custom AMI first.
3. Verify that your instance has been terminated successfully, and the EBS volumes and the EIP address have been deleted/released.
4. Log out of AWS.