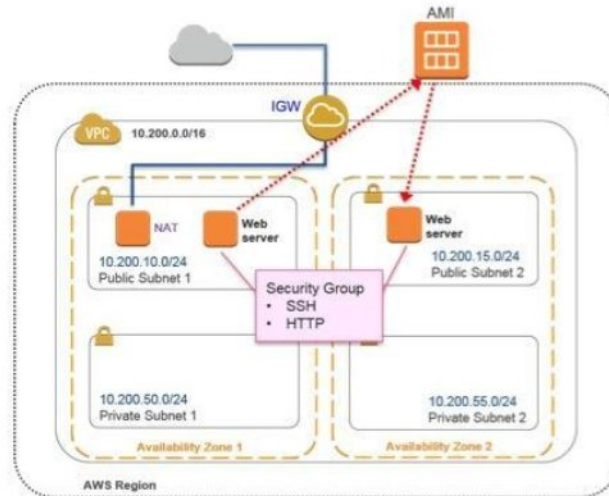# Lab 3: Working with Amazon EC2

Overview	In this lab, you will launch and configure an Amazon EC2 instance based on an Amazon Linux AMI. After the instance starts successfully, you will connect to a Linux instance and then install an Apache web server and a sample application.
	After verifying that the installation has been completed successfully, you will create an Amazon Machine Image (AMI) based on the running instance so that you can easily start an instance with the same settings.

Objectives	After completing this lab, you will be able to: • Create a key pair. • Launch a new Amazon EC2 instance. • Connect to a running instance and install the necessary software. • Create your own Amazon Machine Image (AMI) from the running instance.Create route tables.

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Pre-requisites	This lab requires: • Access to a notebook computer with Wi-Fi running Microsoft Windows, Mac OS X, or Linux (Ubuntu, SuSE, or Red Hat). ○ **Note** The qwikLABS lab environment is not accessible using an iPad or tablet device, but you can use these devices to access the student guide. • For Microsoft Windows users: Administrator access to the computer. • An Internet browser such as Chrome, Firefox, or Internet Explorer 9 (previous versions of Internet Explorer are not supported). • An SSH client, such as PuTTY.

Duration	This lab will require around **40 minutes** to complete.

Task 1: Check the existing VPC and subnets

Overview	In this part of the lab, you will continue from the previous lab and create a key pair. Amazon EC2 uses public-key cryptography to encrypt and decrypt login information. Public-key cryptography uses a public key to encrypt a piece of data, such as a password, and then the recipient uses the private key to decrypt the data. The public and private keys are known as a key pair.
	To log in to your instance, you must create a key pair, specify the name of the key pair when you launch the instance, and provide the private key when you connect to the instance. Linux instances have no password, and you have to use a key pair to log in using SSH.

Task 1-1: Create your VPC

Overview	In the previous lab, you created a VPC and two (or four, if you completed the optional challenge) subnets. In this lab, a similar VPC has been created for you so that you can continue to build your environment in the subnets that you created. In this section of the lab, you will check the properties of those existing subnets.

Step	Instruction
1.1.1	In the **AWS Management Console**, click **VPC**.
1.1.2	In the **VPC Dashboard** pane, click **Your VPCs**.
1.1.3	Select the **LabVPC** check box, and make a note of the **VPC ID** (starting with *vpc-*) and the **VPC CIDR** range (e.g., *10.200.0.0/16*).
1.1.4	In the navigation pane, click **Subnets**.
1.1.5	To view only the subnets that belong to the **LabVPC**, enter the **VPC ID** in the search bar.
1.1.6	You should be able to see that the subnets that have been created for you are identical to the subnets you created in the last lab.

Task 1-2: Create a key pair

Overview	In this section of the lab, you will create a key pair to use with the instances you will create later.

Step	Instruction
1.2.1	On the **Services** menu, click **EC2**.
1.2.2	In the **EC2 Dashboard** pane, click **Key Pairs**. Notice that there is a key pair already created for you by the qwikLABS environment (the name should be similar to *qwikLABS-L465-xxxx*).
1.2.3	Click **Create Key Pair**.
1.2.4	In the **Key pair name** box, type **LabKeyPair**
1.2.5	Click **Create**.
1.2.6	At the next prompt, save the **LabKeyPair.pem** file to your local computer.

Task 2: Launching a New Amazon EC2 Instance

Overview	In this part of the lab, you will go through the steps to launch an Amazon EC2 instance based on an Amazon Linux AMI. Amazon Elastic Compute Cloud (EC2) is a web service that provides resizable compute capacity in the cloud. It provides you with complete control over your computing resources and lets you run on Amazon's computing environment. Amazon EC2 provides developers with the tools to build failure-resilient applications and to isolate themselves from common failure scenarios.

Task 2-1: Create an instance

Overview	In this section of the lab you will launch an Amazon EC2 instance.

Step	Instruction
2.1.1	In the **EC2 Dashboard** pane, click **Instances**.
2.1.2	Click **Launch Instance**.
2.1.3	On the **Choose an Amazon Machine Image (AMI)** page, in the row for **Amazon Linux AMI… (HVM)**, click **Select**.
2.1.4	On the **Choose an Instance Type** page, select **t2.medium**.
2.1.5	Click **Next: Configure Instance Details**.
2.1.6	On the **Configure Instance Details** page, specify the following settings: • **Network:** LabVPC • **Subnet:** PublicSubnet1 • **Auto-assign Public IP:** Enable
2.1.7	Click **Next: Add Storage**.
2.1.8	Accept the default and click **Next: Tag Instance**.
2.1.9	In the **Value** box, type **Lab Instance**
2.1.10	Click **Next: Configure Security Group**.
2.1.11	For **Assign a security group**, the **Create a new security group** option should be selected. Specify the following settings: • **Security group name:** AppSG1 • **Description:** Security group for app instances
2.1.12	Click **Add Rule**. • In the **Type** drop-down list, select **HTTP**. • In the **Source** drop-down list, select **Anywhere**.
2.1.13	Click **Review and Launch**.
2.1.14	Review the settings, and then click **Launch**.

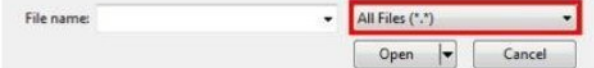| 2.1.15	When prompted, be sure that **LabKeyPair** is selected in the **Select a key pair** drop-down list.
2.1.16	Select the acknowledgement check box, and then click **Launch Instances**.
2.1.17	Click **View Instances**. There are two instances. One is the instance you just created, and the other one is the NAT instance you created in the previous lab.
2.1.18	Select the **Lab Instance** check box, and then make a note of the **Public IP** address on the **Description** tab of the instance.

Task 3: Connecting to Your Instance

Overview	In this part of the lab, you will connect to the Amazon EC2 instance that you just launched using the key pair that you created earlier.

Task 3-1: Connect to the EC2 instance (Windows)

Overview	**Note** This section is for **Windows** users only. If you are running OSX or Linux, skip to **Task 3-2**. In this section of the lab, you will convert your .pem file into a .ppk file and use it to connect to your Amazon EC2 instance using PuTTY.

Step	Instruction
3.1.1	Download **PuTTYgen** from http://the.earth.li/~sgtatham/putty/latest/x86/puttygen.exe **Note** If that link does not work, download PuTTYgen from the following link: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
3.1.2	Run **PuTTYgen** by double-clicking the **puttygen.exe** that you downloaded.
3.1.3	In the **Parameters** section, for **Type of key to generate**, confirm that the option **SSH-2 RSA** is selected, and then click **Load**.
3.1.4	Click **All Files (*.*)** and navigate to where you saved the **LabKeyPair.pem** file.
3.1.5	Click **Open**. When prompted, click **OK** to close.
3.1.6	Click **Save private key**. In the warning message, click **Yes** to close.
3.1.7	In the **File name** box, type **LabKeyPair** Click **Save**.
3.1.8	Close **PuTTY Key Generator**.
3.1.9	Launch **PuTTY**.

3.1.10	In the **Host Name** box, enter the **Public IP** address that you copied in step **2.1.18**.
3.1.11	In the **Connection** list, expand **SSH**.
3.1.12	Click **Auth**.
3.1.13	In the **Private key file for authentication** box, browse to the **LabKeyPair.ppk** file that was generated by PuTTYgen, select it, and then click **Open**.
3.1.14	In the PuTTY security message, click **Yes**.
| 3.1.15 | Log in as **ec2-user**. <br><br> ```
login as: ec2-user
Authenticating with public key "imported-openssh-key"
Last login: Wed Sep 10 05:55:27 2014 from 205.251.233.48

     __|  __|_  )
     _|  (     /   Amazon Linux AMI
    ___|\___|___|

https://aws.amazon.com/amazon-linux-ami/2014.03-release-notes/
9 package(s) needed for security, out of 28 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-10-200-10-152 ~]$
``` |
| 3.1.16 | Continue to **Task 4: Installing software on your instance**. |

Task 3-2: Connect to the EC2 Instance (MacOS and Linux)

Overview	**Note** This section is for **MacOS and Linux** users only. If you are running Windows and have not yet connected to your instance, go back to **Task 3-1**. If you have already connected to your instance, skip ahead to **Task 4**. In this section of the lab, you will connect to your Amazon EC2 instance:

Step	Instruction

3.2.1	To connect to your EC2 instance, run the following commands in Terminal:
	
	      `chmod 400 <path and name of pem>`
	
	      `ssh -i <path and name of pem> ec2-user@<Public IP>`
	
	For `<path and name of pem>`, substitute the path/filename to the .pem file you created in **Task 1-2**.
	
	For `<Public IP>`, substitute the public IP address you noted in step **2.1.18**.

3.2.2	Continue to **Task 4: Installing software on your instance**.

Task 4: Installing Software on Your Instance

Overview	In this part of the lab, you will install:
	• Available updates.
	• An Apache web server.
	A sample PHP application.

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Task 4-1: Install a web server on your instance

Overview	In this section of the lab, you update your EC2 instance, install a web server, and install a php application.

Step	Instruction
4.1.1	To update your instance, execute the following command (We highly recommend that you copy all of these commands from the Command Reference text file found on your qwikLABS page.) `sudo yum -y update` This will run through a check of what updates are available for your instance, download the updates, and install them.
4.1.2	To install a package that creates a web server, execute the following command: `sudo yum -y install httpd php` This command installs an Apache web server and the PHP interpreter.
4.1.3	Execute the following command: `sudo chkconfig httpd on` This configures the Apache web server to automatically start when the instance starts.
4.1.4	Execute the following command `wget https://d2lrzjb0vjvpn5.cloudfront.net/architecting/v4.6/lab-3-working-with-ec2/static/phpapp.zip` This downloads a sample PHP application into the current directory.
4.1.5	Execute the following command: `sudo unzip phpapp.zip -d /var/www/html/` This extracts the PHP application into the default Apache web server directory.

4.1.6	Execute the following command: `sudo service httpd start` This starts the Apache web server.
4.1.7	Open a new web browser window or tab, and enter the **Public IP** address for your instance in the address bar. The sample PHP application is run and the information specific to your Amazon EC2 instance is displayed.
4.1.8	Close the web browser window or tab that you opened in the previous step.
4.1.9	To end your SSH session, type: `exit` and then press ENTER.

Task 5: Creating and Using Your Amazon Machine Image (AMI)

| Overview | In this part of the lab, you will create an AMI from a running instance and then use that AMI to launch a new instance which is virtually identical to your original instance. An AMI provides the information required to launch an instance, which is a virtual server in the cloud.

An AMI includes the following:

- A template for the root volume for the instance.

- Launch permissions that control which AWS accounts can use the AMI to launch instances.

A block device mapping that specifies the volumes to attach to the instance when it's launched. |
|---|---|

Task 5-1: Create an AMI

Overview	In this section of the lab, you will create an Amazon Machine Image (AMI) based on the instance you've already launched, updated, and set up as a web server running a sample PHP application.

Step	Instruction
5.2.1	Return to the **AWS Management Console** and ensure that you are in the **EC2 Dashboard**.
5.2.2	In the **EC2 Dashboard** pane, click **Instances**.
5.2.3	Select the **Lab Instance** check box.
5.2.4	In the **Actions** drop-down list, point over **Image**, and then click **Create Image**.
5.2.5	In the **Create Image** dialog box, modify the following fields: • **Image name**: MyApplication • **Image description**: Sample PHP Application Leave the rest as the default.
5.2.6	Click **Create Image**.
5.2.7	Click the **View pending image** link provided in the confirmation screen. For a few moments, you will see the image in a *pending* state. Periodically refresh your browser to update the status, because this may take a few minutes. When the image is created, the status will change to *available*.

Task 5-2: Create an instance using your AMI

Overview	In this section of the lab, you will launch an Amazon EC2 instance based off of the AMI you created in the prior task.

Step	Instruction
5.3.1	Select the check box for **MyApplication** (the newly created AMI), and then click **Launch**. Notice that this takes you through a menu similar to launching an EC2 instance manually. The first step that you saw previously, where you selected an AMI, is not necessary now because you have already indicated that you want to launch the AMI you just created.
5.3.2	On the **Choose an Instance Type** page, for **Instance Type**, select **t2.medium**. If **t2.medium** is not available to select, choose any other similar instance type (e.g., **t2.small** or **m3.medium**).
5.3.3	Click **Next: Configure Instance Details**.
5.3.4	On the **Configure Instance Details** page, make the following selections: • **Network:** LabVPC • **Subnet:** PublicSubnet2 • **Auto-assign Public IP:** Enable Leave the rest unchanged.
5.3.5	Click **Next: Add Storage**.
5.3.6	Accept the default, and click **Next: Tag Instance**.
5.3.7	In the **Value** box, type **Instance From AMI**
5.3.8	Click **Next: Configure Security Group**.
5.3.9	Leave the **Create a new security group** option selected, and then specify the following settings: • **Security group name:** AppSG2 • **Description:** Security group for app instances

5.3.10	Click **Add Rule**: • In the **Type** drop-down list, select **HTTP**. • In the **Source** drop-down list, select **Anywhere**.
5.3.11	Click **Review and Launch**.
5.3.12	Review the settings, and then click **Launch**.
5.3.13	When prompted, be sure that **LabKeyPair** is selected in the **Select a key pair** drop-down list.
5.3.14	Select the acknowledgement check box, and then click **Launch Instances**.
5.3.15	Click **View Instances**. Wait until the instance state of **AMI Instance** changes to *running*. This may take a few minutes. You can click the Refresh button in the upper-right corner to refresh the status. The **Status Checks** for your new instance should show *2/2 checks passed*.

Task 5-3: Test your AMI instance

Overview	In this section of the lab, you will test to ensure your new instance functions the way it should.

Step	Instruction
5.3.1	Select **Instance From AMI** from the instance list. Ensure no other instances are selected.
5.3.2	Make a note of the **Public IP** address of your new instance.
5.3.3	Open a new web browser window or tab, and enter the Public IP address. The sample PHP application runs and shows you the information specific to your Amazon EC2 instance.

Challenge Task (Optional)

Overview	This part of the lab is optional, and step-by-step instructions are not provided. Use online documentation to help you if necessary. http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html

Challenge 1	In this lab, you launched an Amazon EC2 instance, connected to it, and then installed Apache web server and a sample PHP application. Create a bash or a shell script to **bootstrap** an Amazon EC2 instance to automatically install Apache web server, PHP interpreter, and the sample PHP application. This would allow you to scale using dynamic configuration. **Hint** Refer to the online documentation, Running Commands on Your Linux Instance at Launch, at http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/user-data.html

Challenge 2	In this lab, you created an Amazon EBS-backed AMI. The other kind of AMI that you discussed in the class was an instance store-backed AMI. Create an instance store-backed Linux AMI. **Hint** Refer to the online documentation here: http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/creating-an-ami-instance-store.html

Ending your lab

Overview	When you are finished with your lab, terminate the lab environment using the following steps.

Step	Instruction
1	To log out of the AWS Management Console, from the menu, click **awsstudent @ [YourAccountNumber]** and choose **Sign out** (where [YourAccountNumber] is the AWS account generated by qwikLABS).
2	Close any active SSH client sessions or remote desktop sessions.
3	Click the **End Lab** button on the qwikLABS lab details page in your browser.
4	When prompted for confirmation, click **OK**.
5	For **My Rating**, rate the lab (using the applicable number of stars), optionally type a **Comment**, and click **Submit**. **Note**: The number of stars indicates the following: 1 star = very dissatisfied, 2 stars = dissatisfied, 3 stars = neutral, 4 stars = satisfied, and 5 stars = very satisfied. Also, you may close the dialog if you do not wish to provide feedback.