

# **FUNDAMENTALS OF RED HAT ENTERPRISE LINUX:** LAB SET-UP INSTRUCTIONS FOR EXERCISES ON AMAZON EC2

# INTRODUCTION

The edX course *Fundamentals of Red Hat Enterprise Linux* (RH066x) includes a number of guided exercises and labs, which gives you an opportunity to practice the skills you are learning in the course presentations. To complete these exercises, you will need a practice system running Red Hat Enterprise Linux 7 that you completely control.

One way to get access to a supported Red Hat Enterprise Linux system is to use Amazon EC2 (Elastic Compute Cloud). Red Hat and Amazon Web Services collaborate to provide officially supported Red Hat Enterprise Linux images through Amazon's on-demand public cloud service at free or low cost.

The guided exercises and labs for this course were written assuming that you will set up an account with Amazon Web Services and use it to start a single, simple system running Red Hat Enterprise Linux 7. You will connect to that system securely over the internet and use it to practice commands.

At the time of writing, Amazon Web Services provides an "AWS Free Tier" offering (https://aws.amazon.com/free) which gives new users free access to certain sizes of cloud instances and operating environments (including Red Hat Enterprise Linux 7) for up to 750 hours per month, for 12 months. If you are not eligible for AWS Free Tier or have used up your Free Tier eligibility, a t2.micro-sized instance (cloud computer) running the same software, is currently estimated to cost between US\$0.072 and US\$0.08 per hour of compute time, depending on the data center in which the instance is started. To conserve compute time and any costs, make sure you shut down your cloud instance when you are not using it, and terminate (delete) it when you are completely finished with it.

This guide focuses on the steps needed to set up a new AWS Free Tier account and to use it to launch a simple Red Hat Enterprise Linux 7 instance for the purposes of this course.

## **IMPORTANT NOTICE**

Amazon EC2 is a convenient way to get access to a Red Hat Enterprise Linux system for the purposes of this course. This service is provided by a third party, Amazon Web Services, not by Red Hat itself (although Red Hat does provide the initial AMI image and support for the operating system provided through the service).

The security of your account, and of any cloud instances that you launch in Amazon EC2, is your responsibility. You are also responsible for charges you may incur, if any, by using this service. The instance that you are running is potentially visible to the public internet, and making changes to your default settings beyond those discussed in the course, such as running network services and opening ports in the firewall provided by AWS, or changing SSH server settings in the cloud instance, may have consequences for the security of the cloud instances you are operating.

# **CREATING AN "AWS FREE TIER" ACCOUNT**

Open a web browser and navigate to <u>https://aws.amazon.com/free/</u>.



# Choose **CREATE A FREE ACCOUNT**.

On the subsequent page, provide an email address, select **I am a new user**, and click **Sign In using our secure server**.



Sign In or Create an AWS Account What is your email (phone for mobile accounts)? E-mail or mobile number:	
● I am a new user.	AWS Accounts Include
and my password is:	12 Months of Free Tier Access
	Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB
Sign in using our secure server b Forgot your password?	Visit aws.amazon.com/free for full offer terms
Learn more about <u>AWS Identity and Access Management</u> and <u>AWS Mult</u> your AWS Account. View full <u>AWS Free Usage Tier</u> offer terms.	-Factor Authentication, features that provide additional security for

On the next page, fill out the form with your name, an existing email address for the account, and a secure password. Then click **Create account**.

Login Creue	ntials	
Use the form below to	create login credentials that can be	e used for AWS as well as Amazon.com.
	My name is:	
	My e-mail address is:	1
	Type it again:	
		note: this is the e-mail address that we will use to contact you about your account
	Enter a new password:	
	Type it again:	
		Create account
About Amazon com Sign In		
Amazon Web Services uses inform ov our Terms of Use and Privacy I	nation from your Amazon.com accoun Policy linked below. Your use of Amazo	t to identify you and allow access to Amazon Web Services. Your use of this site is govern on Web Services products and services is governed by the AWS Customer Agreement link

An amazon.com. company

On the next page, provide appropriate contact information, and indicate whether this account is a company or personal account.

Amazon Web Services requires that you have payment information on record with your account, even if you only plan to use the AWS Free Tier. This is in case you want to use more cloud resources than are provided by the AWS Free Tier, or to charge you when your eligibility for AWS Free Tier expires. Enter appropriate payment information.

Amazon Web Services will then verify your contact information and ability to set up this account. You will be asked to provide (or confirm) a phone number. An automated system will immediately call you and provide information so that you can enter a PIN to confirm you received the message.

web services			Amazon W	Veb Services S
ontact Information	Payment Information	Identity Verification	Support Plan	Confirmation
Supp	ort Plan ——			
AWS Supp service, A resources plan that b	oort offers a selection of plans WS documentation, writepape to help you plan, deploy, and best aligns with your AWS usag lease. Select One	to meet your needs. All plans p rs, and support forums. For ac optimize your AWS environmen je.	provide 24x7 access to custom cess to technical support and a it, we recommend selecting a s	er additonal support
	Basic	o for account and billing questi	ions and spaces to the MMC	
	Community Forums. Price: Included	e for account and bining quest	ons and access to the AWS	
0	Developer			
	Use case: Experimenting wit	n AWS		
	Description: One primary cor gct a rcsponsc within 12–24	ntact may ask technical question hours during local business ho	ns through Support Center and urs.	d
	Price: Starts at \$29/month (s	cales based on usage)		
0	Business			
	Use case: Production use of	AWS		

On the final page, choose a support plan. The Basic plan is free.

You are now registered with Amazon Web Services. Feel free to explore the various tutorials to get oriented to the environment. It may take Amazon up to 24 hours to fully activate your account. Check your email regularly in case any information needs to be clarified.

# LAUNCH A NEW AMAZON EC2 INSTANCE

In this section, we will briefly outline the process to create and launch a Red Hat Enterprise Linux 7 cloud instance for use as your machine for hands-on exercises. Open a web browser, navigate to <u>https://aws.amazon.com/free/</u>, and click **Sign In to the Console**. You should see a screen similar to the one below:



At the time of writing, Amazon appears to set up new accounts to start new virtual machines in the US-West-2 (Oregon) data center by default. This may be far from your network location and result in higher latency for your connection. In the upper right-hand corner of the Console, there is a menu which allows you to set which data center you want to use before you launch your virtual machine as shown in the screenshot below. Select an appropriate location from the menu.



## Click the Launch a virtual machine link. This should load the EC2 Quick Launch screen:



#### Click Get Started.

et started creating a General Purpose instance in the <b>US West (Oregon)</b> region that is powerful enough to run nost web apps.	Name Operating System Instance Type
it web apps.          Name your EC2 instance         This is how you will identify your instance in AWS console. Choose a name that is easy for you to remember.         My-Lab-Machine         Use this name	Private Key Private Key What we're launching for you Your virtual machine will be set up using the following AWS services: Virtual Machine EC2 Instance Storage EBS Volume
Cancel	Security Group

Enter a name for your instance and click **Use this name**. The following screen should appear:

et started creating a General Purpose instance in the <b>US West (Oregon)</b> region that is powerful enough to run most web	Vame Operating System
	Instance Type
	Private Key
My-Lab-Machine	What we're launching for yo
	Your virtual machine will be set up using the
	following AWS services:
	Virtual Machine
Select an Operating System	EC2 Instance
Select an operating system	Storage
	EBS Volume
redit Suse 🥹 📭	Firewall Security Group
Amazon Linux Red Hat Linux SUSE Linux Ubuntu Windows AMI Enterprise 7.2 Enterprise Server 14.04 LTS Server 2012 R2 Base more options	
Next	
Next	
Next	
Next	

Choose **Red Hat Linux Enterprise 7.2** and click **Next**. (Note that at the time of testing, this actually selected an AMI based on Red Hat Enterprise Linux 7.3, contrary to the label on the interface.)

Select an Operating System Red Hat Linux	Virtual Machine E02 Instance Storoge EBS Volume Firewa I Security Group
Select an instance type	
t2.micro 1 Core vCFU (up to 3.3 GHz), 1 GiB Memory RAM, 8 GB Storage FREE TIER ELIGIBLE	
Need a different instance type? AWS offers additional options through the advanced FC2 Launch Instance wizard.	
Next	

Choose **t2.micro** as your instance type (note that it is labeled **FREE TIER ELIGIBLE**) and then click **Next**. You will be prompted to create or select a key pair for authenticating your remote login:

	Firewall Security Group
Select an instance type	
t2.micro 1 Core vCPU (up to 3.3 GHz), 1 GiB Memory RAM, 8 GB Storage FREE TIER ELIGIBLE	
Create a key pair	
Amazon EC2 secures your instance using a key pair. In this step you will download the private key to your computer.	
Save it in a safe place and use it when you connect to your instance.	
My-Lab-Machine	
Download	

Name the key pair and click **Download**. Note the warning that AWS does not keep a copy of your private key; if you lose this file after download, you will not be able to recover it. Keep this file safe; if anyone else obtains a copy of it, they can use it to log in to your cloud instance. Click **Okay! Start Download** to confirm the download.

	Quick Launch an EC2 Instance - Mozilla	Firefox		. в х
🔋 Quick Launch an EC2 In × +				
🔶 🖲 🔒   https://us-west-2.console.aws.amazon.	com/quickstart/vm/home?region=us-west-2		C Q Search	☆ 自 🖊 🛷 😑
🛅 Red Hat External 🗠 🎽 Red Hat Presentatio 🌱	🕲 Red Hat E-Business Sui 🚾 Red Hat Support 🔤 IT New Hire Hub 🤜 I.T. Toolbox			
	Select an Operating System	<u>·</u>	Your virual machine v Virual Machine EC2 Intervo Storage EB5 Vidure Frewal Security Group	ill be set up using the following AWS services:
	Select an instance type t2.micro 1 Core vCPU (up to 3.3 GHz), 1 GiB Memory RAM, 8 GB Storage Prestore Lucate			
	Private Key mytab2 Cenerate a new key Cancel Create this instance			
🗨 Feedback 😧 English		© 2008 - 201	.7, Amazon Web Services, Inc. or its attiliates. A	Il rights reserved. Privacy Policy Terms of Use

Finally, click **Create this instance** to start your machine for the first time.

uick Launch an EC2 Instance	Quick Start Steps		
et started creating a General Purpose instance in the US West (My-Lab-Instance)	<ul> <li>✓ Name</li> <li>✓ Operating System</li> <li>✓ Instance Type</li> <li>✓ Private Key</li> <li>What we're launching for you</li> <li>Your virtual machine will be set up using the following AWS services:</li> </ul>		
Select an Operating S rector	System d Hat Linux		Virtaal Machine Kitaale Storage EBS Volume Finewalt Security Group
Select an instance ty t2. 1 C	pe micro ore vCPU (up to 3.3 GHz), 1 GiB Memory RAM, 8 GB Storage Reaz	FOR ELGOILE	
Private Key	r-Lab-Instance lerate a new key		
YOUR INSTANCE IS LA Amazon EC2 is launching your instanc You can proceed to the EC2 Console w	UNCHING! ee. This process should only take a few mi while this process takes place.	nutes.	What we're launching for you Your virtual machine will be set up us the following AWS services: Virtual Machine
My	r-Lab-Machine s: In progress		EC2 Instance Storage EBS Volume Firewall Security Group
While you wait, learn more abo	put		
Managing your Instance	Connecting to your Instance	Securing your Instance	
You can manage your instance in the EC2 console. Click on your instance and explore available options in the console.	You can connect to your instance with your client. In the EC2 console, select your instance and click 'Connect' for detailed instructions.	Io protect your instance, we've configured a security group (a firewall) to only accept connections from your current IP (50.157.84.43). To enable other connections, such as HTTP, add rules to the security group.	
See your instance in EC2 console	Go to EC2 console	Configure security group	
	Proceed to EC2 console		

You can immediately click **Proceed to EC2 console** or wait until the instance shows **Status: Completed** to make sure that it is running.

EC2 Dashboard	Launch Instance Connect A	actions ~			ତ <b>କ ଡ</b>
Tags	Q Name : My-Lab-Instance 💿 🗛	dd filter		0	< < 1 to 1 of 1 > >
Reports Limits	Name - Instance ID	▲ Instance Type → Availability Zone → Ins	tance State - Status Checks - Alarm Status	Public DNS (IPv4) ~ IPv4 Public IP ~ IPv6 IPs	✓ Key Name ✓
INSTANCES	My-Lab-Insta i-060b5a57b	01fdd11b t2.micro us-west-2c 🥥	running 🛣 Initializing None ≽ e	c2-34-210-56-134.us 34.210.56.134 -	My-Lab-Instance
Instances					
Spot Requests					
Reserved Instances					
Dedicated Heate					
Dedicated Hosts					
IMAGES	-		6.8.6		
AMIs	Instance: i-060b5a57b01fdd11b	My-Lab-Instance) Public DNS: ec2-34-210-56-134.u	s-west-2.compute.amazonaws.com		
Bundle Tasks					
ELASTIC BLOCK STORE	Description Status Checks	Monitoring Tags			
Volumes	Instance ID	i-060b5a57b01fdd11b	Public DNS (IPv4)	ec2-34-210-56-134.us-west-2.compute.amazonaws.com	
Snapshots	Instance state	running	IPv4 Public IP	34.210.56.134	
	Instance type	t2.micro	IPv6 IPs	2	
Security Groups	Elastic IPs		Private DNS	ip-172-31-1-37.us-west-2.compute.internal	
Elactic IDe	Availability zone	us-west-2c	Private IPs	172.31.1.37	
Placement Groups	Security groups	My-Lab-Instance-WebServerSecurityGroup-RZT5BDQ0TYDF	view Secondary private IPs		
Key Daire	Colored and another	Inbound rules	10010		
Network laterfeese	Scheduled events	No scheduled events	VPCID Sector	vpc-agor/20ce	
metwork interfaces	Platform	NIEC-7.5_11VW_0AP20101020-X00_04-1-R00Ry2-0P2 (aminon	Network interfaces	eth0	
LOAD BALANCING	IAM role		Source/dest check	The	1
Load Balancers	IAM TOP	Mari ab Instance	Source/dest. cilear	1 T 1000	

When the **Instance State** for your instance is **running**, you can connect to your Red Hat Enterprise Linux 7 instance.

# CONNECTING TO YOUR RED HAT ENTERPRISE LINUX INSTANCE ON AMAZON EC2

The recommended way to access your Red Hat Enterprise Linux cloud instance for this course is to use Secure Shell (**ssh**) to get an interactive shell on the system.

#### Step 1: Getting SSH

If you are using macOS or Linux: The OpenSSH command (**ssh**) should already be installed on your computer. Start a terminal program to get a shell, and proceed to the next step.

If you are using Microsoft Windows, you will need to get an SSH client as follows:

- Option 1: Download **Git for Windows** from <a href="https://git-scm.com/download/win">https://git-scm.com/download/win</a> and install it using the default settings. When it is installed, right-click on your desktop (not an icon or a file) and select **Git Bash Here** to open a **Git Bash** command prompt. An SSH client is provided with **Git Bash** and you can continue with Step 2.
- Option 2: If you have the PuTTY client, which can be downloaded from <a href="http://www.chiark.greenend.org.uk/~sgtatham/putty/">http://www.chiark.greenend.org.uk/~sgtatham/putty/</a>, and you are familiar with that tool, you can use that to connect to your instance. AWS provides a tutorial on this at <a href="https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/putty.html">https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/putty.html</a>.

#### Step 2: Connecting to your instance with SSH

From the Amazon EC2 console, in the left-side menu under **INSTANCES**, click **Instances** to display a list of the instances you have running. This is probably just the one you set up for this course. Select its checkbox and click **Connect**:

	EC2 Dashboard	Launch Instance	Connect	Actions v			
	Events						
	Tags	Q Name : My-La	ab-Instance 💿	Add filter			
	Reports						
	Limits	Name Name	- Instance	ID ▲ Ir	istance Type	Availability Zone 👻	Instance State 👻
	INSTANCES	My-Lab-Insta	a i-060b5a5	7b01fdd11b t2	.micro	us-west-2c	running
1	Instances						
	Spot Requests						
	Reserved Instances						
	Scheduled Instances						
	Dedicated Heate						
	Deulcateu Hosts						
-	IMAGES	-					
	AMIs	Instance: i-060b	5a57b01fdd11	o (My-Lab-Instai	nce) Public	DNS: ec2-34-210-56-1	34.us-west-2.compu
	Bundle Tasks						
	ELASTIC BLOCK STORE	Description	Status Checks	Monitoring	Tags		
0.00	Volumes		Instance ID	i-060b5a57b0	Ifdd11b		
	Spanshots		Instance state	running	Induitio		
	onaponoto		Instance state	t2 micro			
-	NETWORK & SECURITY		Elastic IPs	Lanioro			
	Security Groups		Availability zono	us-west-2c			
	Elactic IDe		Availability 2016	us west-20			

This should display a box with instructions on how to use your SSH client to connect to the selected instance, similar to the following:

Connect To Your Ins	tance	×					
I would like to connect with	A standalone SSH client						
	A Java SSH Client directly from my browser (Java required)						
To access your instance:							
1. Open an SSH client. (find	out how to connect using PuTTY)						
<ol> <li>Locate your private key f the instance.</li> </ol>	ile (My-Key-Pair.pem). The wizard automatically detects the key you used to laund	ch					
3. Your key must not be pu	3. Your key must not be publicly viewable for SSH to work. Use this command if needed:						
chmod 400 My-Key-Pair.pem							
4. Connect to your instance	e using its Public DNS:						
ec2-52-26-146-90.us-west-2.compute.amazonaws.com							
Example:							
ssh -i "My-Key-Pa	air.pem" ec2-user@ec2-52-26-146-90.us-west-2.compute.amazonaws.	com					
Please note that in m your AMI usage instru	ost cases the username above will be correct, however please ensure that you rea actions to ensure that the AMI owner has not changed the default AMI username.	d					
If you need any assistance con	necting to your instance, please see our connection documentation .						

Note that the **-i** option to the **ssh** command expects the appropriate relative or absolute path to the file in which your private key is stored.

Close

In your shell prompt (using **Terminal** on macOS or Linux, or **Git Bash** on Windows or other program), use these instructions to connect to your Red Hat Enterprise Linux instance on Amazon EC2.

# STOPPING YOUR RED HAT ENTERPRISE LINUX INSTANCE ON AMAZON EC2

When you are not using your Red Hat Enterprise Linux instance for lab exercises, you should stop it in order to conserve your compute time (or to control costs if you are not using AWS Free Tier).

To do this, log in to your AWS account and go to the EC2 Console, and select the **Instances** view as discussed above. Right-click on the instance you want to stop to display the following menu:



Under **Instance State**, click **Stop**. Click **Yes**, **Stop** to confirm that you want to stop the instance. We do not use the ephemeral storage in this course.

Watch the status of the instance in the EC2 Console to ensure that it actually stops. It should transition to the state **stopping** and then **stopped**.

Stopping your instance temporarily shuts it down, but does not remove the machine from Amazon EC2. You can still restart it later.

# **RESTARTING YOUR RED HAT ENTERPRISE LINUX INSTANCE IN AMAZON EC2**

Restarting a stopped instance is very similar to stopping one. Log in to your AWS account and go to the EC2 Console, and select the **Instances** view as discussed above. Right-click the instance you want to start to display the submenu, and under **Instance State**, click **Start**. Click **Yes, Start** to confirm you want to start the instance.

Watch the status of the instance in the EC2 Console to ensure that it starts. It should transition to the state **pending** and then **running**.

Your Red Hat Enterprise Linux instance will have a different public host name and IP address than it did before it was stopped, so you will need to select it and click **Connect** to confirm the new SSH command to use.

## TERMINATING YOUR RED HAT ENTERPRISE LINUX INSTANCE IN AMAZON EC2

At the end of the course, you should stop and completely terminate your instance to remove it from Amazon EC2 permanently. This avoids such things as any risk of charges for long term storage (beyond the term of your AWS Free Tier initial year, for example).

To terminate an instance, log in to your AWS account and go to the EC2 Console, and select the **Instances** view as discussed above. Right-click the instance you want to terminate to display the submenu, and under **Instance State**, click **Terminate**. You will be warned that this will remove all local storage.

**Warning:** The next step is permanent and irreversible. Click **Yes, Terminate** to confirm you want to destroy the instance.

Watch the status of the instance in the EC2 Console to ensure that it is terminated. It should transition to the state **terminated**.

#### LOGGING OUT OF AMAZON EC2

You are responsible for the security of your Amazon EC2 account. You should ensure that you log out of Amazon Web Services when you are finished using it. Click your username at the top of the web dashboard, and click **Sign Out** in the menu.

**Warning:** Signing out of the web console DOES NOT automatically stop or terminate any running Amazon EC2 instances. They will continue to run until you stop or terminate them.

# **ADDITIONAL REFERENCES**

How to Launch a Linux Virtual Machine on the Cloud: <u>https://aws.amazon.com/getting-started/tutorials/launch-a-virtual-machine/</u>

Amazon Elastic Compute Cloud User Guide for Linux Instances:

#### http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html

You might want to look into taking additional steps to secure your AWS account with two-factor authentication, or to limit which hosts can contact your instances by using Security Groups. See the AWS documentation for details.

The AMI providing the Red Hat Enterprise Linux 7.3 operating system tested for this course was **ami-6f68cf0f** (RHEL-7.3\_HVM\_GA-20161026-x86\_64-1-Hourly2-GP2). It is expected that this course will function with other official Red Hat Enterprise Linux 7 AMIs as well.