Amazon Web Services
Hands on EC2

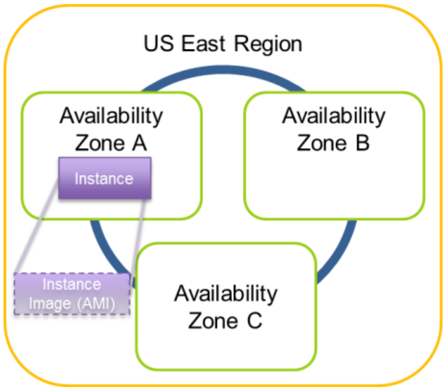
December, 2012

Table of Contents

Overview

This lab will walk the user through launching, configuring, and customizing an EC2 virtual machine. The following is high-level overview of this lab:

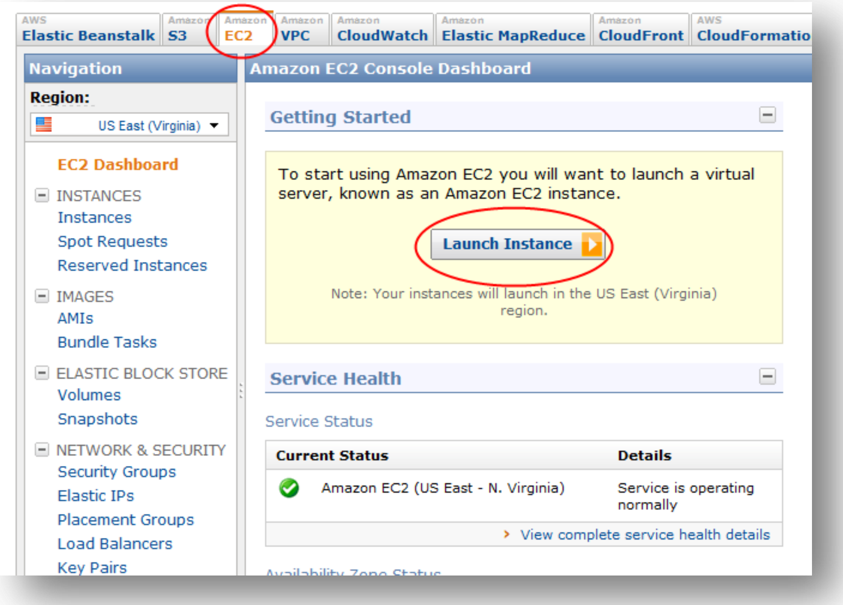
- Launch and Configure an Instance (Linux and Windows)
- Create a custom Amazon Machine Image (Linux and Windows)
- Assign a Fixed IP Address



Launch a Linux Instance

In this example we will launch a default Amazon Linux Instance with an Apache PHP web server installed on initialization.

Navigate to the EC2 tab in the AWS Console and click on **Launch Instance**



Amazon EC2 Console Dashboard

Getting Started

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

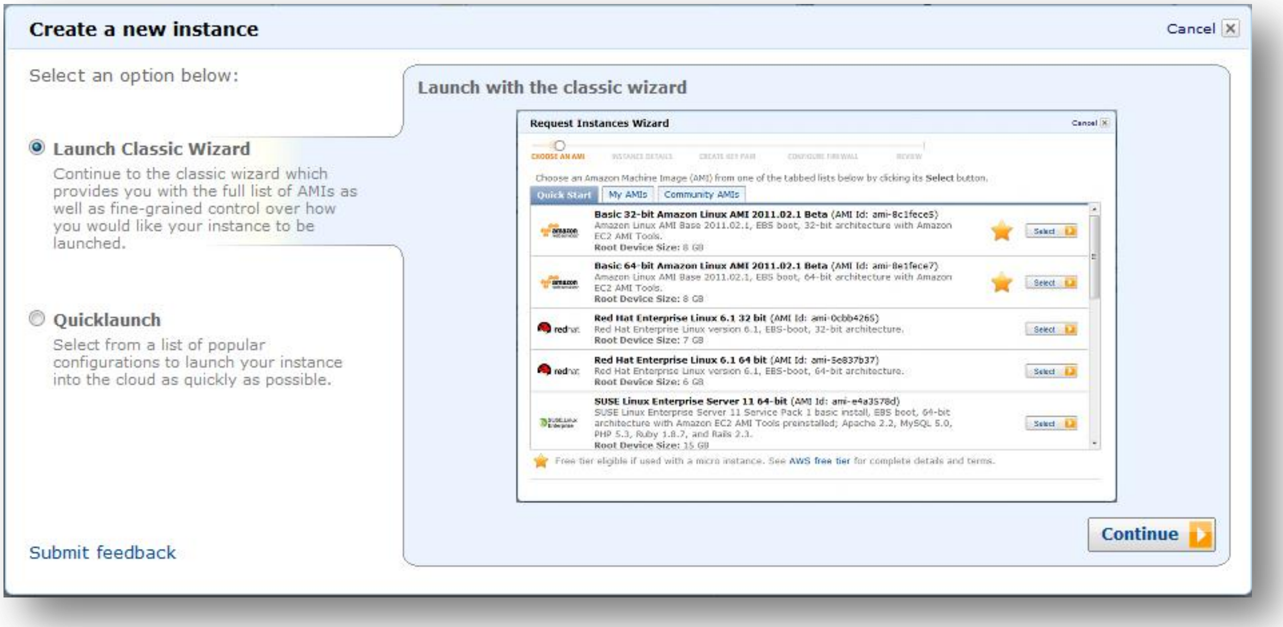
Note: Your instances will launch in the US East (Virginia) region.

Service Health

Service Status

Current Status	Details
Amazon EC2 (US East - N. Virginia)	Service is operating normally

Select **Launch Classic Wizard** and click **Continue**



Create a new instance

Select an option below:

● Launch Classic Wizard
Continue to the classic wizard which provides you with the full list of AMIs as well as fine-grained control over how you would like your instance to be launched.

○ Quicklaunch
Select from a list of popular configurations to launch your instance into the cloud as quickly as possible.

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Basic 32-bit Amazon Linux AMI 2011.02.1 Beta (AMI Id: ami-8c1fece5)
Amazon Linux AMI Base 2011.02.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools.
Root Device Size: 8 GB

Basic 64-bit Amazon Linux AMI 2011.02.1 Beta (AMI Id: ami-8e1fece7)
Amazon Linux AMI Base 2011.02.1, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools.
Root Device Size: 8 GB

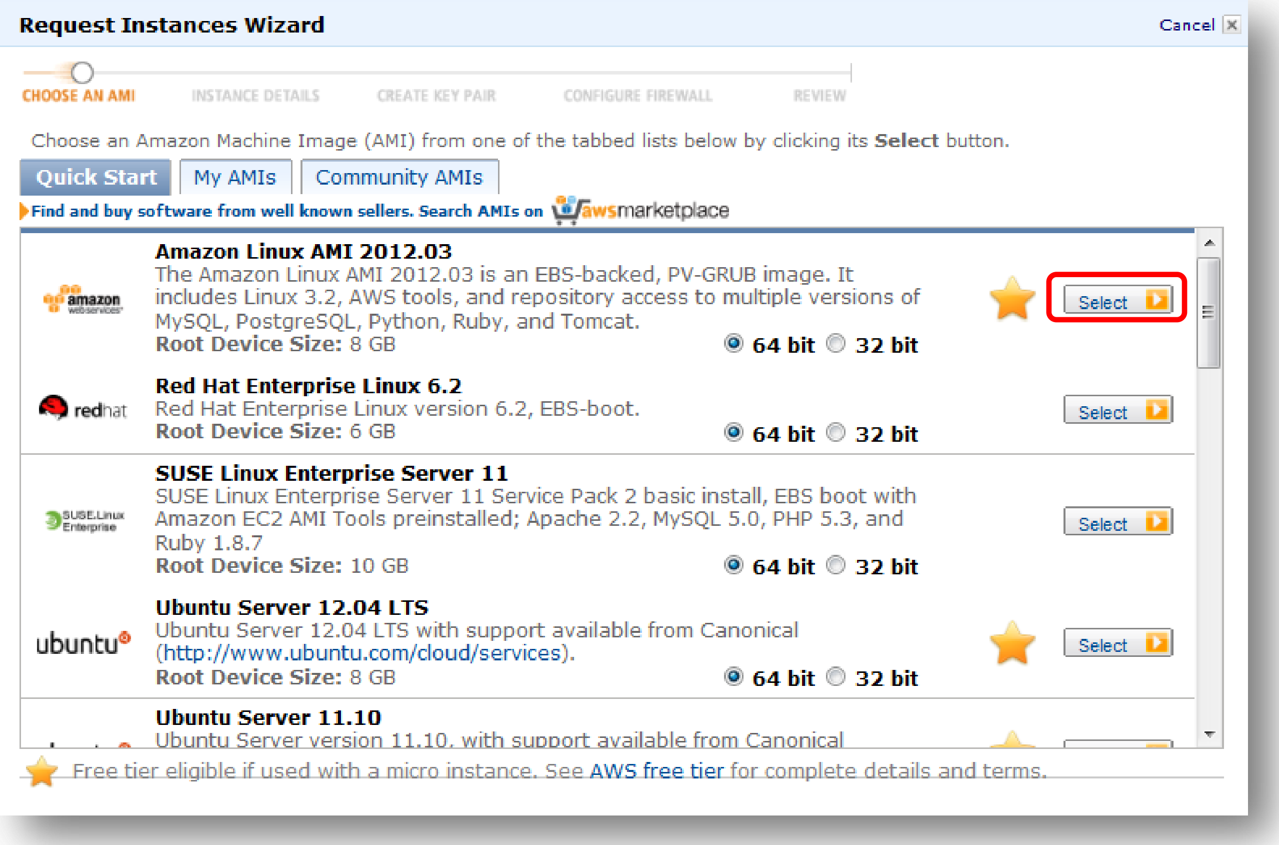
Red Hat Enterprise Linux 6.1 32 bit (AMI Id: ami-0cbb4265)
Red Hat Enterprise Linux version 6.1, EBS-boot, 32-bit architecture.
Root Device Size: 7 GB

Red Hat Enterprise Linux 6.1 64 bit (AMI Id: ami-5e837b37)
Red Hat Enterprise Linux version 6.1, EBS-boot, 64-bit architecture.
Root Device Size: 6 GB

SUSE Linux Enterprise Server 11 64-bit (AMI Id: ami-e4a3578d)
SUSE Linux Enterprise Server 11 Service Pack 1 basic install, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.0, PHP 5.3, Ruby 1.8.7, and Rails 2.3.
Root Device Size: 15 GB

Free tier eligible if used with a micro instance. See AWS free tier for complete details and terms.

Select the Basic 64-bit Amazon Linux AMI



Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Find and buy software from well known sellers. Search AMIs on awsmarketplace

Amazon Linux AMI 2012.03
The Amazon Linux AMI 2012.03 is an EBS-backed, PV-GRUB image. It includes Linux 3.2, AWS tools, and repository access to multiple versions of MySQL, PostgreSQL, Python, Ruby, and Tomcat.
Root Device Size: 8 GB ● 64 bit ○ 32 bit

Red Hat Enterprise Linux 6.2
Red Hat Enterprise Linux version 6.2, EBS-boot.
Root Device Size: 6 GB ● 64 bit ○ 32 bit

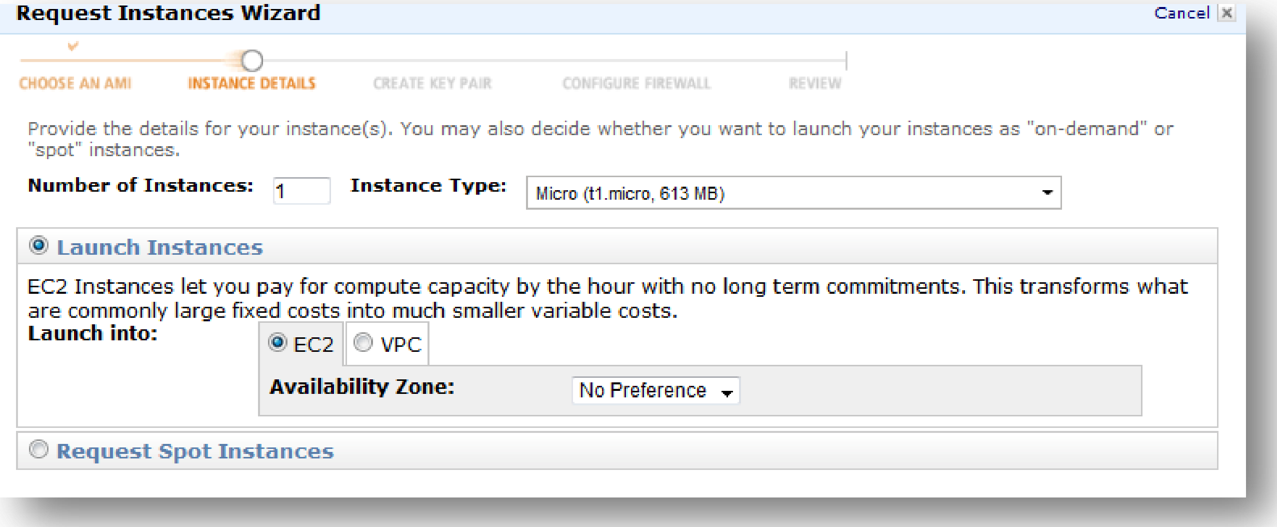
SUSE Linux Enterprise Server 11
SUSE Linux Enterprise Server 11 Service Pack 2 basic install, EBS boot with Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.0, PHP 5.3, and Ruby 1.8.7
Root Device Size: 10 GB ● 64 bit ○ 32 bit

Ubuntu Server 12.04 LTS
Ubuntu Server 12.04 LTS with support available from Canonical (http://www.ubuntu.com/cloud/services).
Root Device Size: 8 GB ● 64 bit ○ 32 bit

Ubuntu Server 11.10
Ubuntu Server version 11.10, with support available from Canonical

Free tier eligible if used with a micro instance. See AWS free tier for complete details and terms.

Select the **Micro (t1.micro)** instance size and click **Continue**



Provide the details for your instance(s). You may also decide whether you want to launch your instances as "on-demand" or "spot" instances.

Number of Instances: 1 **Instance Type:** Micro (t1.micro, 613 MB)

● **Launch Instances**

EC2 Instances let you pay for compute capacity by the hour with no long term commitments. This transforms what are commonly large fixed costs into much smaller variable costs.

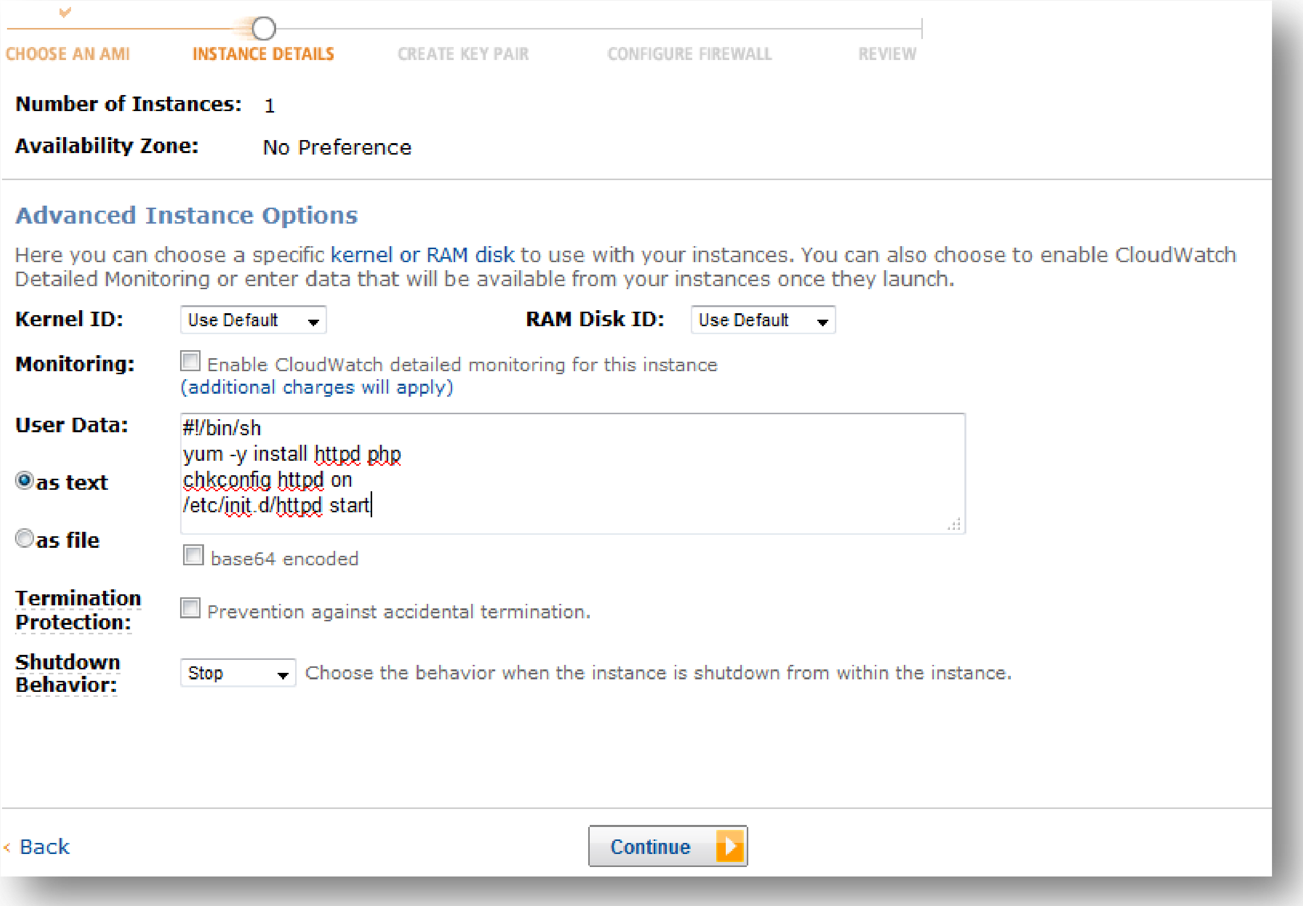
Launch into: ● EC2 ○ VPC

Availability Zone: No Preference

○ **Request Spot Instances**

In the next screen, copy & paste the following initialization script (you may need to type this into Notepad and copy & paste the results) into the User Data field (this will automatically install and start Apache on launch) and click Continue:

```
#!/bin/sh
yum -y install httpd php
chkconfig httpd on
/etc/init.d/httpd start
```



Number of Instances: 1

Availability Zone: No Preference

Advanced Instance Options

Here you can choose a specific kernel or RAM disk to use with your instances. You can also choose to enable CloudWatch Detailed Monitoring or enter data that will be available from your instances once they launch.

Kernel ID: Use Default   RAM Disk ID: Use Default

Monitoring: □ Enable CloudWatch detailed monitoring for this instance (additional charges will apply)

User Data:

```
#!/bin/sh
yum -y install httpd php
chkconfig httpd on
/etc/init.d/httpd start
```

● as text

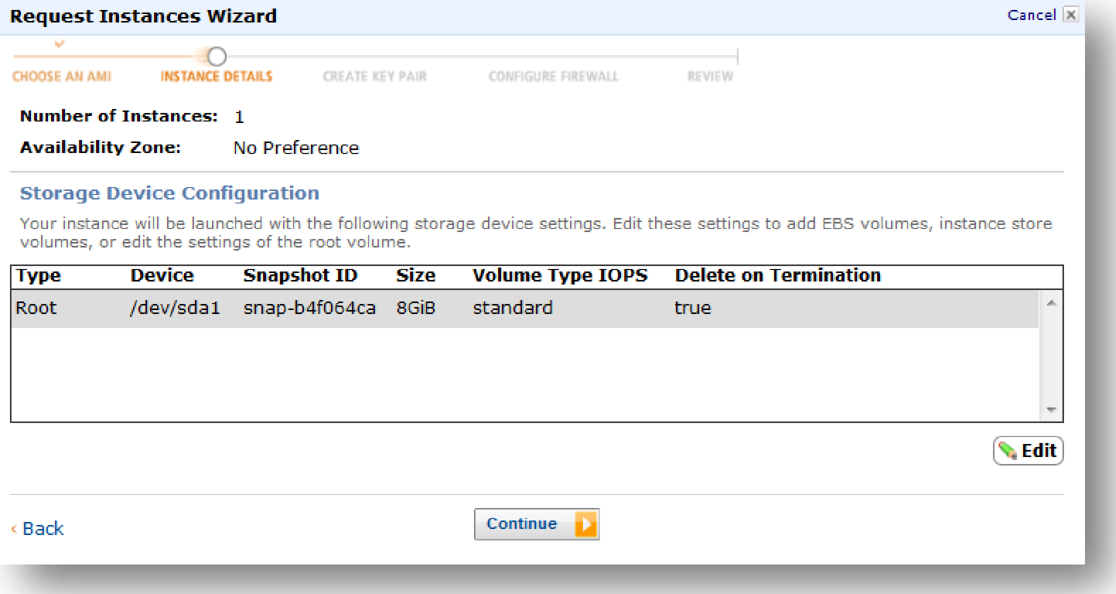
○ as file

□ base64 encoded

Termination Protection: □ Prevention against accidental termination.

Shutdown Behavior: Stop   Choose the behavior when the instance is shutdown from within the instance.

Click **Continue** to accept the default Storage Device Configuration.



Number of Instances: 1

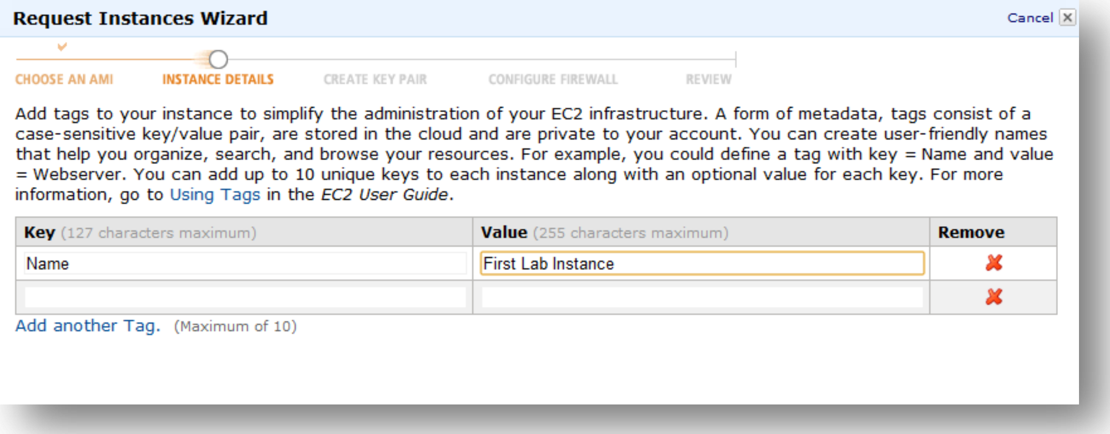
Availability Zone: No Preference

Storage Device Configuration

Your instance will be launched with the following storage device settings. Edit these settings to add EBS volumes, instance store volumes, or edit the settings of the root volume.

Type	Device	Snapshot ID	Size	Volume Type	IOPS	Delete on Termination
Root	/dev/sda1	snap-b4f064ca	8GiB	standard		true

Next, choose a "friendly name" for your AMI. This name, more correctly known as a tag, will appear in the console once the instance launches. It makes it easy to keep track of running machines in a complex environment. We named ours "First Lab Instance"; however the only thing that matters is whether the name is meaningful to you. Then click **Continue**.

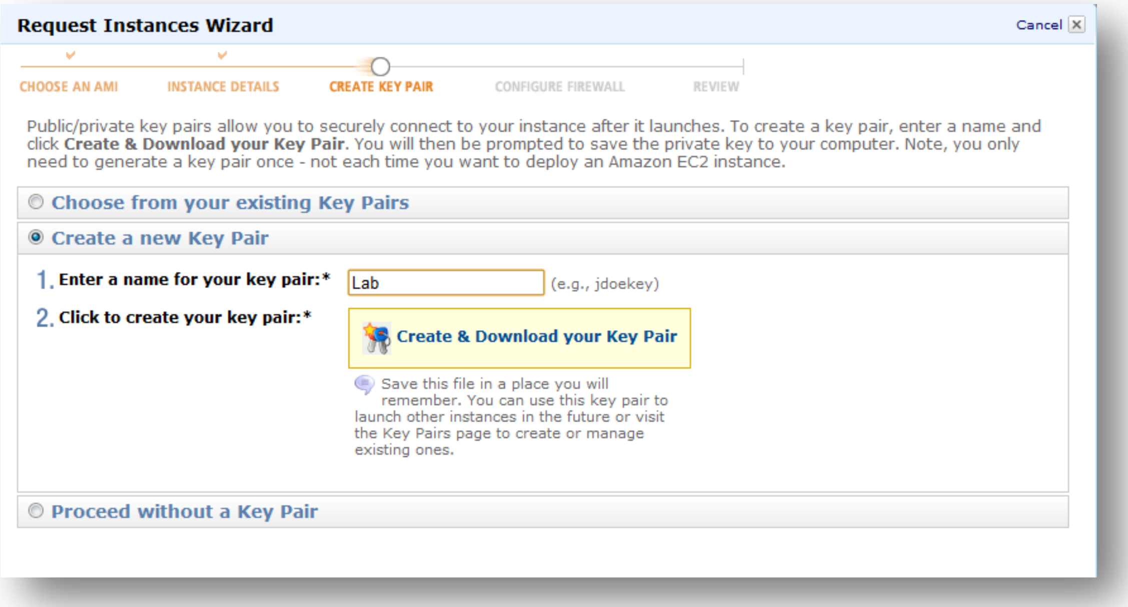


Add tags to your instance to simplify the administration of your EC2 infrastructure. A form of metadata, tags consist of a case-sensitive key/value pair, are stored in the cloud and are private to your account. You can create user-friendly names that help you organize, search, and browse your resources. For example, you could define a tag with key = Name and value = Webserver. You can add up to 10 unique keys to each instance along with an optional value for each key. For more information, go to Using Tags in the *EC2 User Guide*.

Key (127 characters maximum)	**Value** (255 characters maximum)	**Remove**
Name	First Lab Instance	✗
		✗

Add another Tag. (Maximum of 10)

Then create a key pair, if one does not already exist on your local hard drive, and download it to c:\ec2. Per the example below, we named the key pair "Lab" in this example.



Request Instances Wizard

Public/private key pairs allow you to securely connect to your instance after it launches. To create a key pair, enter a name and click **Create & Download your Key Pair**. You will then be prompted to save the private key to your computer. Note, you only need to generate a key pair once - not each time you want to deploy an Amazon EC2 instance.

○ Choose from your existing Key Pairs

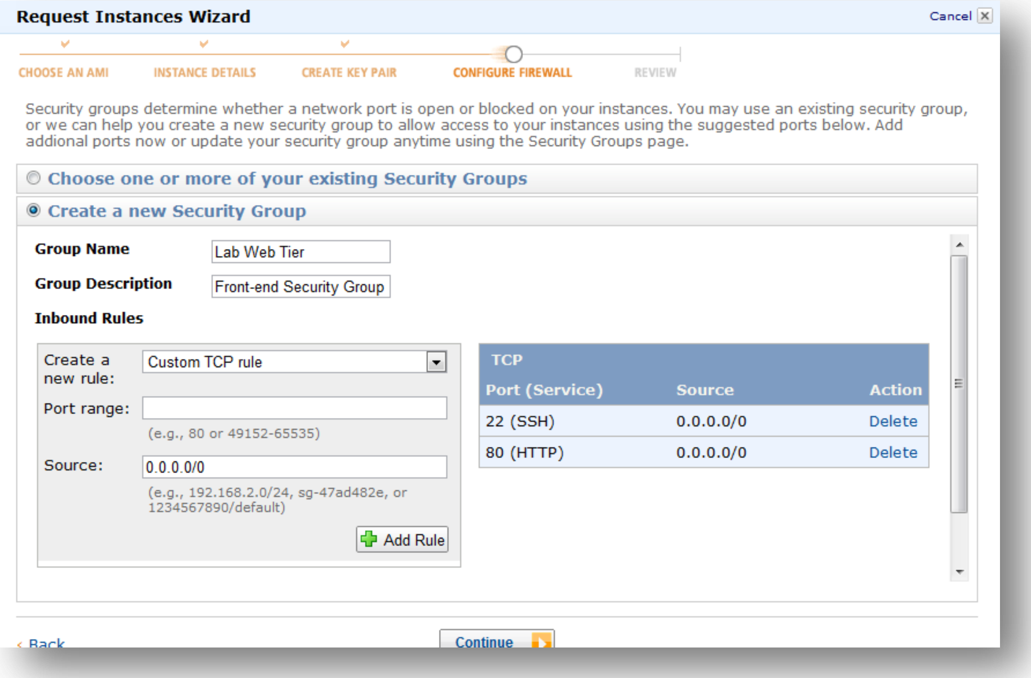
● Create a new Key Pair

1. **Enter a name for your key pair:*** Lab (e.g., jdoekey)
2. **Click to create your key pair:*** Create & Download your Key Pair

Save this file in a place you will remember. You can use this key pair to launch other instances in the future or visit the Key Pairs page to create or manage existing ones.

○ Proceed without a Key Pair

Create a security group, which will be your firewall rules. On the assumption that we are building out a Web server, we named this one "Lab Web Tier", and opened ports 22 and 80.



Request Instances Wizard

Security groups determine whether a network port is open or blocked on your instances. You may use an existing security group, or we can help you create a new security group to allow access to your instances using the suggested ports below. Add addional ports now or update your security group anytime using the Security Groups page.

○ Choose one or more of your existing Security Groups

● Create a new Security Group

Group Name Lab Web Tier

Group Description Front-end Security Group

Inbound Rules

Create a new rule: Custom TCP rule

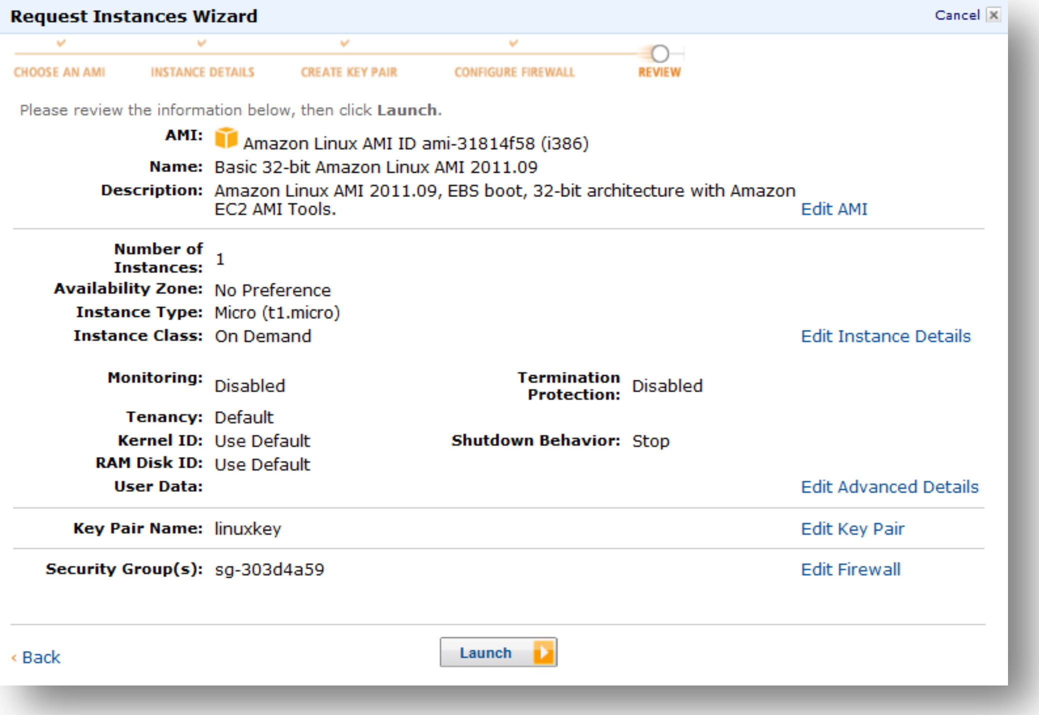
Port range: (e.g., 80 or 49152-65535)

Source: 0.0.0.0/0 (e.g., 192.168.2.0/24, sg-47ad482e, or 1234567890/default)

Add Rule

TCP		
Port (Service)	Source	Action
22 (SSH)	0.0.0.0/0	Delete
80 (HTTP)	0.0.0.0/0	Delete

Review your choices, and then click **Launch**.



Please review the information below, then click **Launch**.

AMI: Amazon Linux AMI ID ami-31814f58 (i386)
Name: Basic 32-bit Amazon Linux AMI 2011.09
Description: Amazon Linux AMI 2011.09, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools.

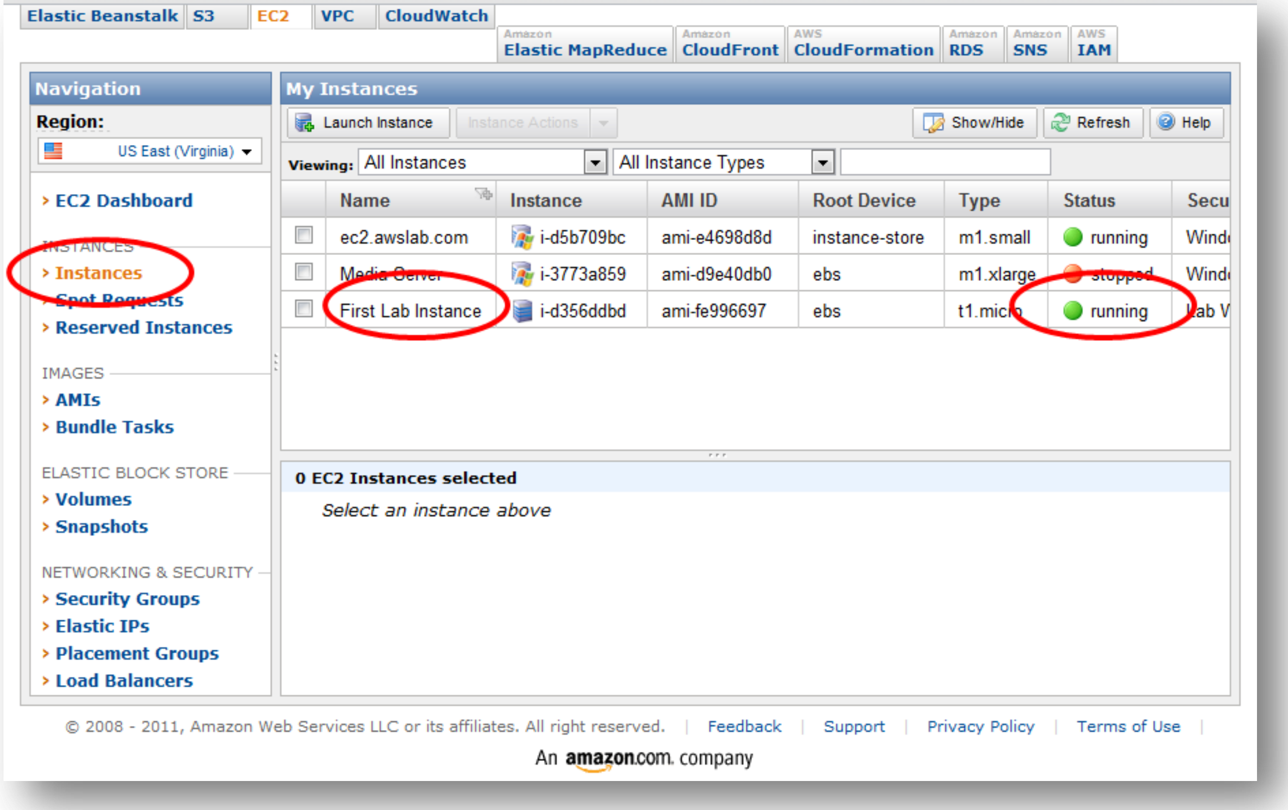
Number of Instances: 1
Availability Zone: No Preference
Instance Type: Micro (t1.micro)
Instance Class: On Demand

Monitoring: Disabled
Termination Protection: Disabled
Tenancy: Default
Kernel ID: Use Default
Shutdown Behavior: Stop
RAM Disk ID: Use Default
User Data:

Key Pair Name: linuxkey

Security Group(s): sg-303d4a59

Launch the instance and monitor it to make certain it's running.



	Name	Instance	AMI ID	Root Device	Type	Status	Secu
□	ec2.awslab.com	i-d5b709bc	ami-e4698d8d	instance-store	m1.small	● running	Wind
□	Media Server	i-3773a859	ami-d9e40db0	ebs	m1.xlarge	● stopped	Wind
□	First Lab Instance	i-d356ddbd	ami-fe996697	ebs	t1.micro	● running	Lab V

0 EC2 Instances selected

Select an instance above

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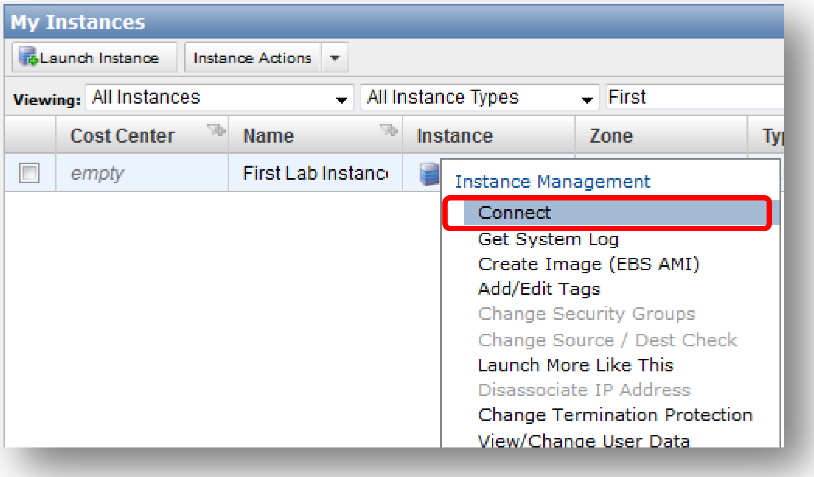
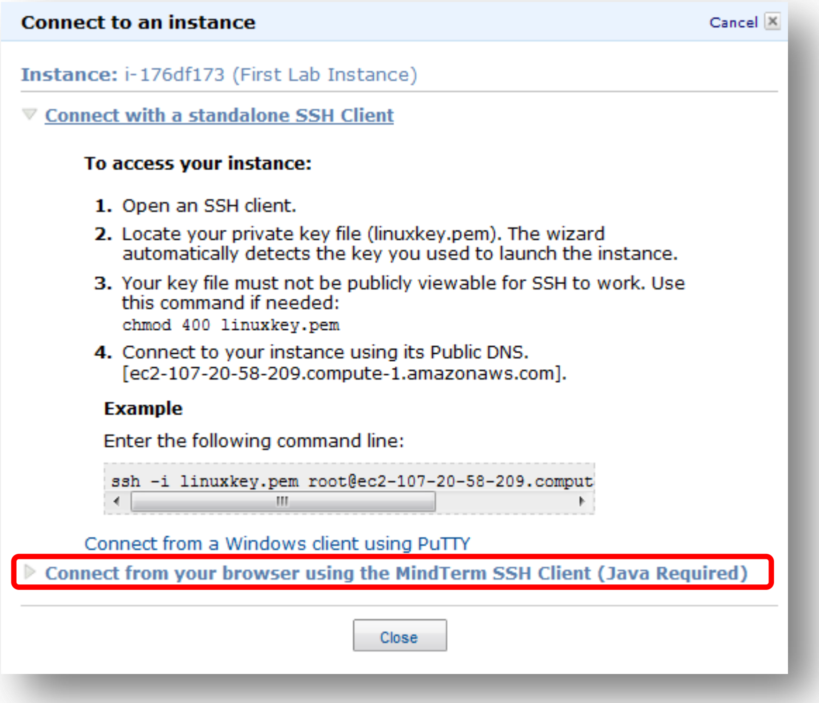
Connect to the Linux Instance Using the Console (MindTerm)

These instructions require Java to launch the MindTerm SSH client through the console. If you do not have Java, or would prefer to use a stand alone SSH client, please see the Appendix for instructions on using PuTTY.

Once the instance is running, right-click on the instance and select “**Connect**”



Next click on **Connect from your browser using the MindTerm SSH Client**



Connect to an instance

Cancel

Instance: i-176df173 (First Lab Instance)

Connect with a standalone SSH Client

To access your instance:

1. Open an SSH client.
2. Locate your private key file (linuxkey.pem). The wizard automatically detects the key you used to launch the instance.
3. Your key file must not be publicly viewable for SSH to work. Use this command if needed:
   `chmod 400 linuxkey.pem`
4. Connect to your instance using its Public DNS. [ec2-107-20-58-209.compute-1.amazonaws.com].

Example

Enter the following command line:

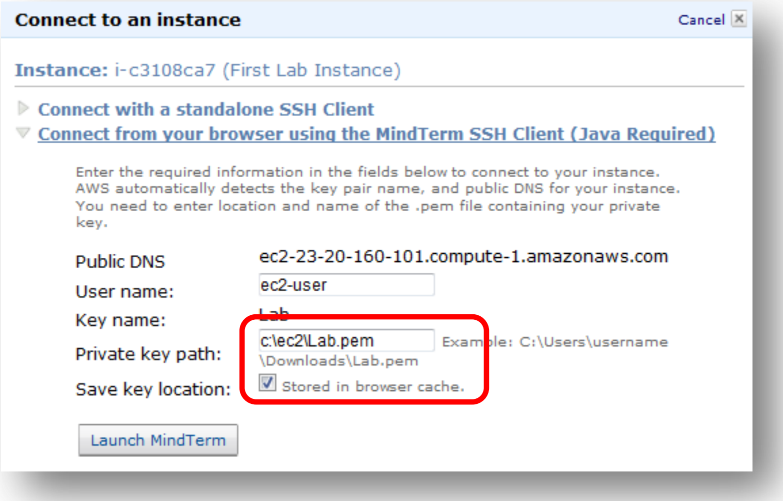
```
ssh -i linuxkey.pem root@ec2-107-20-58-209.comput
```

Connect from a Windows client using PuTTY

Connect from your browser using the MindTerm SSH Client (Java Required)

Close

Make sure the User name is **ec2-user**, provide the location to your private key (C:\ec2\Lab.pem), and check the option to save the key location (not the key itself) in browser cache so you will not have to retype this location in every time you connect to EC2 instances. Then click on **Launch MindTerm**.



Connect to an instance

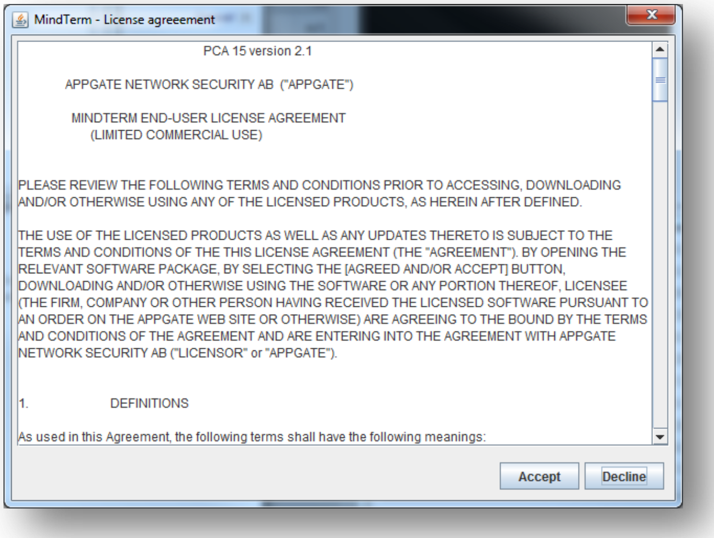
Instance: i-c3108ca7 (First Lab Instance)

Connect with a standalone SSH Client
Connect from your browser using the MindTerm SSH Client (Java Required)

Enter the required information in the fields below to connect to your instance. AWS automatically detects the key pair name, and public DNS for your instance. You need to enter location and name of the .pem file containing your private key.

Public DNS ec2-23-20-160-101.compute-1.amazonaws.com
User name: ec2-user
Key name: Lab
Private key path: c:\ec2\Lab.pem Example: C:\Users\username \Downloads\Lab.pem
Save key location: ☑ Stored in browser cache.

It can take some time for the MindTerm applet to download and run. If this is the first time you have used MindTerm, you will be prompted to accept the MindTerm EULA:



MindTerm - License agreement

PCA 15 version 2.1

APPGATE NETWORK SECURITY AB ("APPGATE")

MINDTERM END-USER LICENSE AGREEMENT
(LIMITED COMMERCIAL USE)

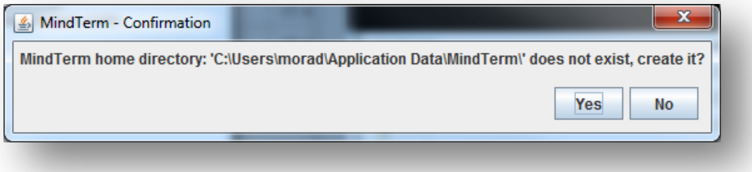
PLEASE REVIEW THE FOLLOWING TERMS AND CONDITIONS PRIOR TO ACCESSING, DOWNLOADING AND/OR OTHERWISE USING ANY OF THE LICENSED PRODUCTS, AS HEREIN AFTER DEFINED.

THE USE OF THE LICENSED PRODUCTS AS WELL AS ANY UPDATES THERETO IS SUBJECT TO THE TERMS AND CONDITIONS OF THE THIS LICENSE AGREEMENT (THE "AGREEMENT"). BY OPENING THE RELEVANT SOFTWARE PACKAGE, BY SELECTING THE [AGREED AND/OR ACCEPT] BUTTON, DOWNLOADING AND/OR OTHERWISE USING THE SOFTWARE OR ANY PORTION THEREOF, LICENSEE (THE FIRM, COMPANY OR OTHER PERSON HAVING RECEIVED THE LICENSED SOFTWARE PURSUANT TO AN ORDER ON THE APPGATE WEB SITE OR OTHERWISE) ARE AGREEING TO THE BOUND BY THE TERMS AND CONDITIONS OF THE AGREEMENT AND ARE ENTERING INTO THE AGREEMENT WITH APPGATE NETWORK SECURITY AB ("LICENSOR" or "APPGATE").

1. DEFINITIONS

As used in this Agreement, the following terms shall have the following meanings:

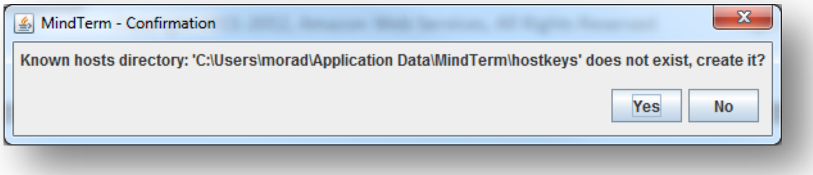
You will be asked to create a directory for MindTerm:



MindTerm - Confirmation

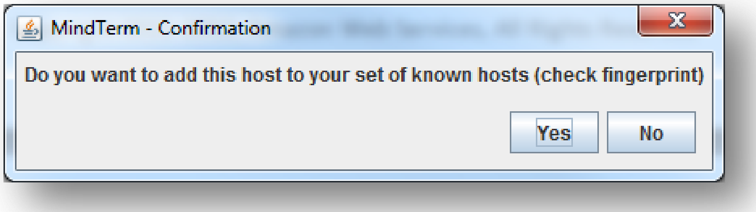
MindTerm home directory: 'C:\Users\morad\Application Data\MindTerm\' does not exist, create it?

Next you will be asked to create a directory for MindTerm to use to store host keys:



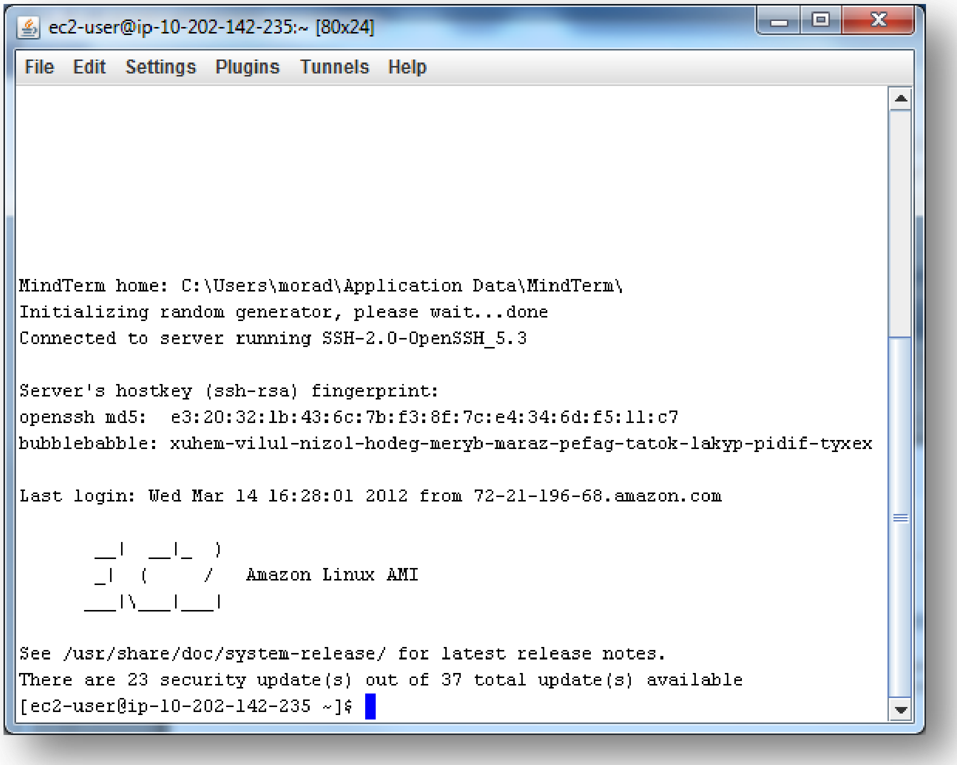
Known hosts directory: 'C:\Users\morad\Application Data\MindTerm\hostkeys' does not exist, create it?

And finally you will be asked if you want to store the host key for your Instance. At this point you have the option to verify the host key MindTerm is seeing with the host key provided by the AWS console to verify that you are connecting directly to your EC2 instance and not some third-party in the middle.



Do you want to add this host to your set of known hosts (check fingerprint)

And finally, you should be logged into your Instance:



```
MindTerm home: C:\Users\morad\Application Data\MindTerm\
Initializing random generator, please wait...done
Connected to server running SSH-2.0-OpenSSH_5.3

Server's hostkey (ssh-rsa) fingerprint:
openssh md5:  e3:20:32:1b:43:6c:7b:f3:8f:7c:e4:34:6d:f5:11:c7
bubblebabble: xuhem-vilul-nizol-hodeg-meryb-maraz-pefag-tatok-lakyp-pidif-tyxex

Last login: Wed Mar 14 16:28:01 2012 from 72-21-196-68.amazon.com

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

See /usr/share/doc/system-release/ for latest release notes.
There are 23 security update(s) out of 37 total update(s) available
[ec2-user@ip-10-202-142-235 ~]$ 
```

Once logged in, we're going to modify the default web page to display information about this instance.

Configure the Linux Instance

The AMI has already been customized with the installation of Apache and PHP from the script you entered as User Data when the instance was launched. Modify the web server by adding the following index.php file:

```
cd /var/www/html
sudo vi index.php
```

If you are an experienced Linux user, apologies for telling you how to use vi, the default text editor. For everyone else, vi is not an intuitive program.

Press **`i`**

Enter the following:

```
<?php
  $url = "http://169.254.169.254/latest/meta-data/instance-id";
  $instance_id = file_get_contents($url);
  echo "Instance ID: <b>" . $instance_id . "</b><br/>";
  $url = "http://169.254.169.254/latest/meta-data/placement/availability-zone";
  $zone = file_get_contents($url);
  echo "Zone: <b>" . $zone . "</b><br/>";
?>
```

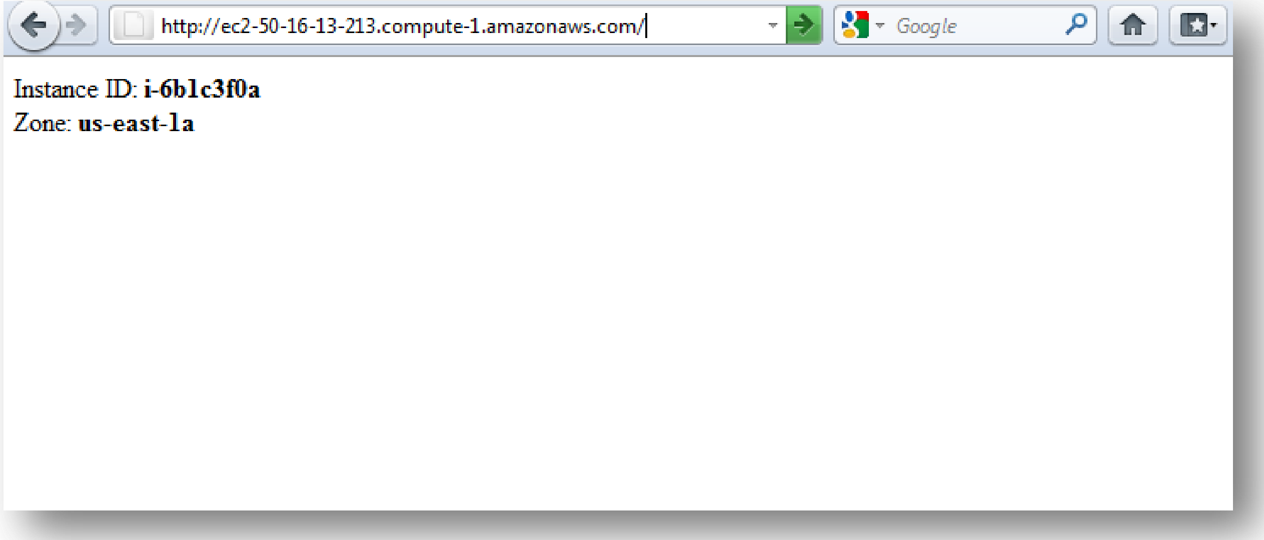
Press **`escape`**

Followed by **`:wq`**

This will save and quit after you add the PHP code above. This code will display the web server's ID and Availability Zone.

Connect to the web server

Enter the DNS name into the browser and connect to the server:

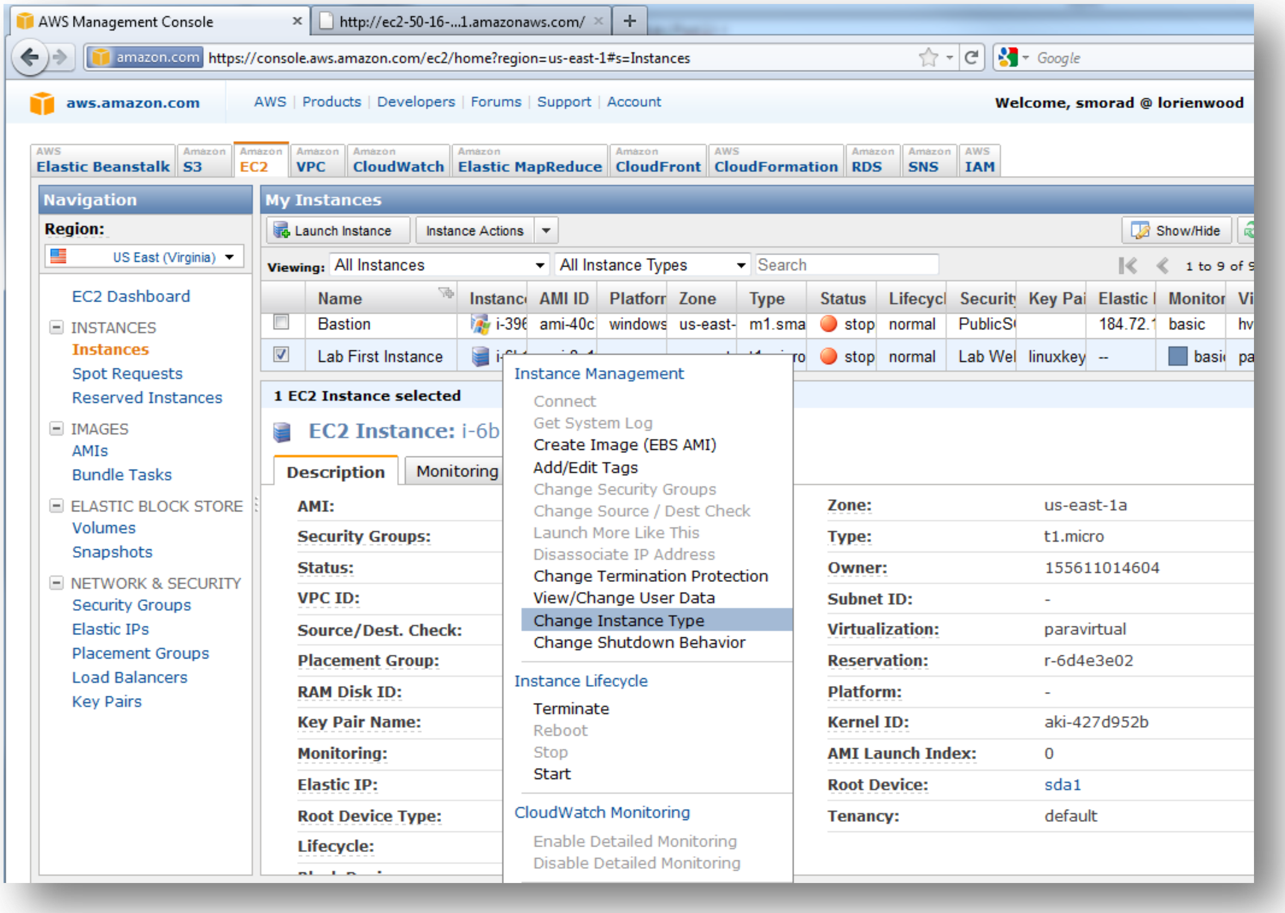


Instance ID: **i-6b1c3f0a**
Zone: **us-east-1a**

Change the Instance Type

Did you know that you can change the instance type that an AMI is running on? This only works with EBS-backed instances (what we're running here). There is no particular reason to change the instance type in this lab, but the following steps outline how easy it is to do in AWS.

In the AWS Console, select your lab instance, then right-click on it and stop (NOT terminate!) the instance. After it has stopped, right-click on it again and select "Change Instance Type"



	Name	Instanc	AMI ID	Platforr	Zone	Type	Status	Lifecycl	Securit	Key Pai	Elastic I	Monitor	Vi
□	Bastion	i-396	ami-40c	windows	us-east-	m1.sma	● stop	normal	PublicS		184.72.1	basic	hv
☑	Lab First Instance	i-				ro	● stop	normal	Lab Wel	linuxkey	--	basi	pa

AMI:
Security Groups:
Status:
VPC ID:
Source/Dest. Check:
Placement Group:
RAM Disk ID:
Key Pair Name:
Monitoring:
Elastic IP:
Root Device Type:
Lifecycle:

Zone:	us-east-1a
Type:	t1.micro
Owner:	155611014604
Subnet ID:	-
Virtualization:	paravirtual
Reservation:	r-6d4e3e02
Platform:	-
Kernel ID:	aki-427d952b
AMI Launch Index:	0
Root Device:	sda1
Tenancy:	default

After going through the options and selecting your new instance type, right-click your lab instance and start it again.

Alternatively, you can use the EC2 command-line to script this change with the following command:

```
        ec2-modify-instance-attribute <instance_id> -t <instance_type>
```

For example:

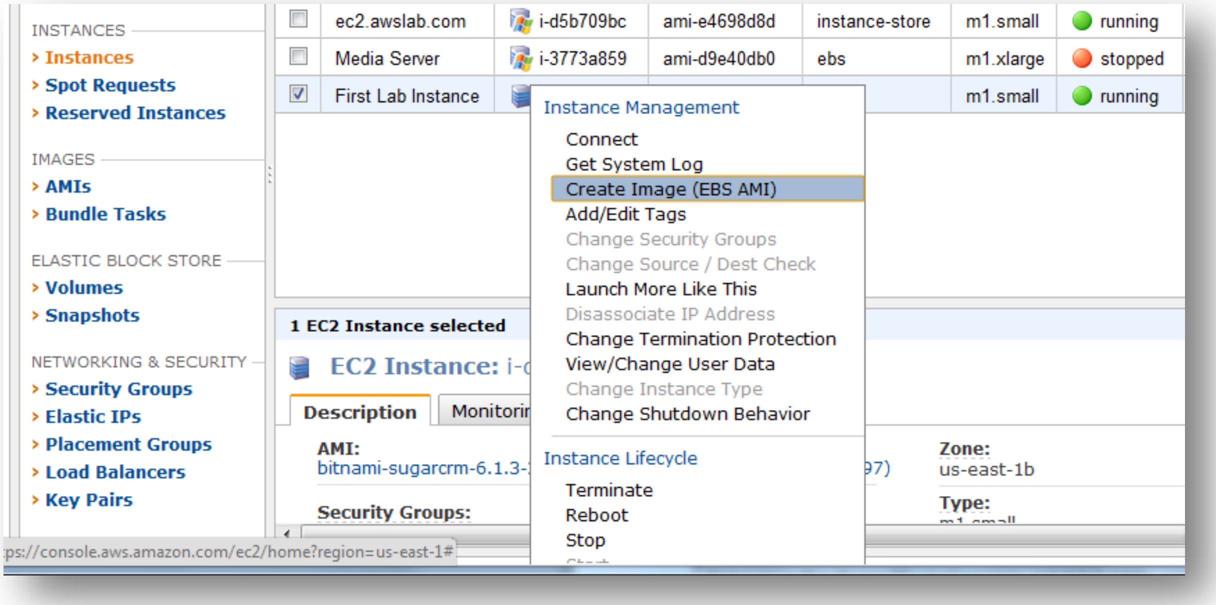
```
        ec2-modify-instance-attribute i-c1202cad -t m1.small
```

Create a Custom AMI

We now have a fairly customized system, so we are going to create a custom AMI, visible only to us, that is a freeze-dried copy of what's running now. Then when we launch a new server, it will be preconfigured with all the changes that we've made.

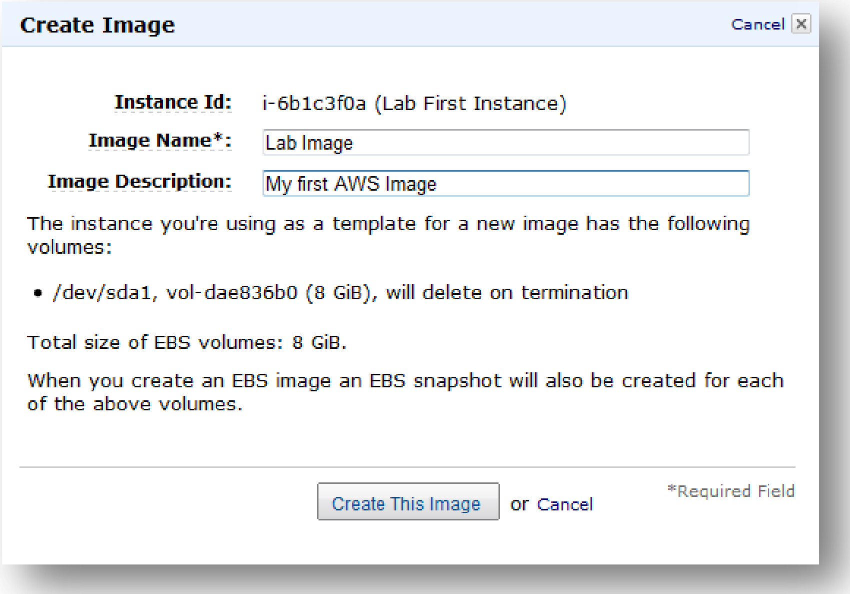
Bundle the Image

In the AWS Console, right-click on the instance and choose "Create Image (EBS AMI)".



☐	ec2.awslab.com	i-d5b709bc	ami-e4698d8d	instance-store	m1.small	● running
☐	Media Server	i-3773a859	ami-d9e40db0	ebs	m1.xlarge	● stopped
☑	First Lab Instance				m1.small	● running

Provide a name and image on the next screen, then click “Create This Image”. The instance will automatically be stopped (not terminated), and then a snapshot will be created. You’ll know when the process finishes, because the server will automatically restart and send you another email.



Instance Id: i-6b1c3f0a (Lab First Instance)

Image Name*: Lab Image

Image Description: My first AWS Image

The instance you're using as a template for a new image has the following volumes:

- /dev/sda1, vol-dae836b0 (8 GiB), will delete on termination

Total size of EBS volumes: 8 GiB.

When you create an EBS image an EBS snapshot will also be created for each of the above volumes.

Note: If you use S3-backed images, the bundling process is significantly different. Accordingly, these instructions are only valid for EBS-backed images.

Once finished, there will be two new entries in the AWS Console. Under *Snapshots* you’ll see an entry for the snapshot (backup), and under AMIs owned by you there will be an AMI registered, based on the snapshot.

Note: it’s also possible to create a custom AMI from the command line with the `ec2-create-image` command. This command also gives you an advanced option to add a “`--no-reboot`” argument. It’s a very handy tool; however you’ll need to execute "`sudo sync`" in the Linux instance before you create the new image, in order to ensure all data is written to the disk. Otherwise the most recent files written to the disk may be 0 bytes long.

Test the instance

Before we terminate the already-running instance, let’s make certain that the new one works. In the AWS Console, click on AMIs and your image should be listed under “Owned By Me”. Launch the instance, using the same keypair and security group as before. Use a new name, such as “Second Instance” in order that you can distinguish one from the other.
Make certain that both SSH and the Web Page work.

Terminate the Original Instance

Well, not quite yet. Note that we now have two web servers. So we already have a scalable application! And if your new server started in a different availability zone than the first one, you also have redundancy.

Now terminate the original server. The instance and its local file system will be recycled back into the cloud.

Assign a Fixed IP

How do you set up practical DNS names for your web server? Using an address such as http://ec2-75-101-197-112.compute-1.amazonaws.com/ is not likely to win the day with your customers. Setting up a DNS record that points to http://www.yourdomain.com is easy enough – until you reboot the server and the underlying DNS name and IP address both change.

AWS offers Elastic IP Addresses, which are actually NAT addresses that operate at a regional level. That is, an Elastic IP Address works across Availability Zones, within a single region.
Assign one to your application as follows:

- Click on the Elastic IPs link in the AWS Console
- Allocate a new address
- Associate the address with a running instance. If you change instances, it's as simple as allocating the address to the new instance.
- If you have a domain name you can create a DNS "A" record in your own DNS server that points tt.mydomain.com to <<your elastic IP>>.

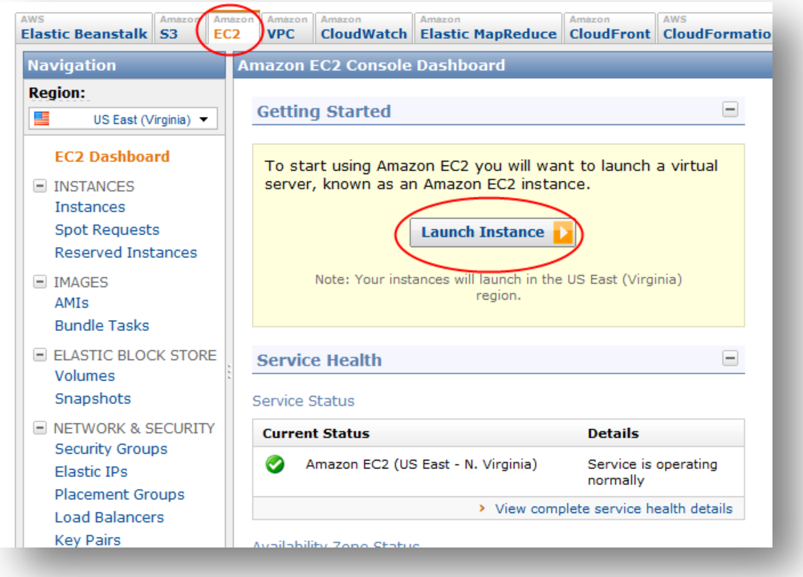
Two Important Notes:

1. As long as an Elastic IP address is associated with a running instance, there is no charge for it. However an address that is not associated with a running instance costs $0.01/hour. This prevents address hoarding; however it also means that you need to delete any addresses you create, or you will incur an ongoing charge.
2. Load balancing (covered in the next section) requires CNAME records instead of "A" records. So Elastic IP is not required for load-balanced applications.

Launch a Windows Instance

In this example we will launch a default Amazon provided Windows 2008 R2 instance with IIS preinstalled.

Navigate to the EC2 tab in the AWS Console and click on **Launch Instance**

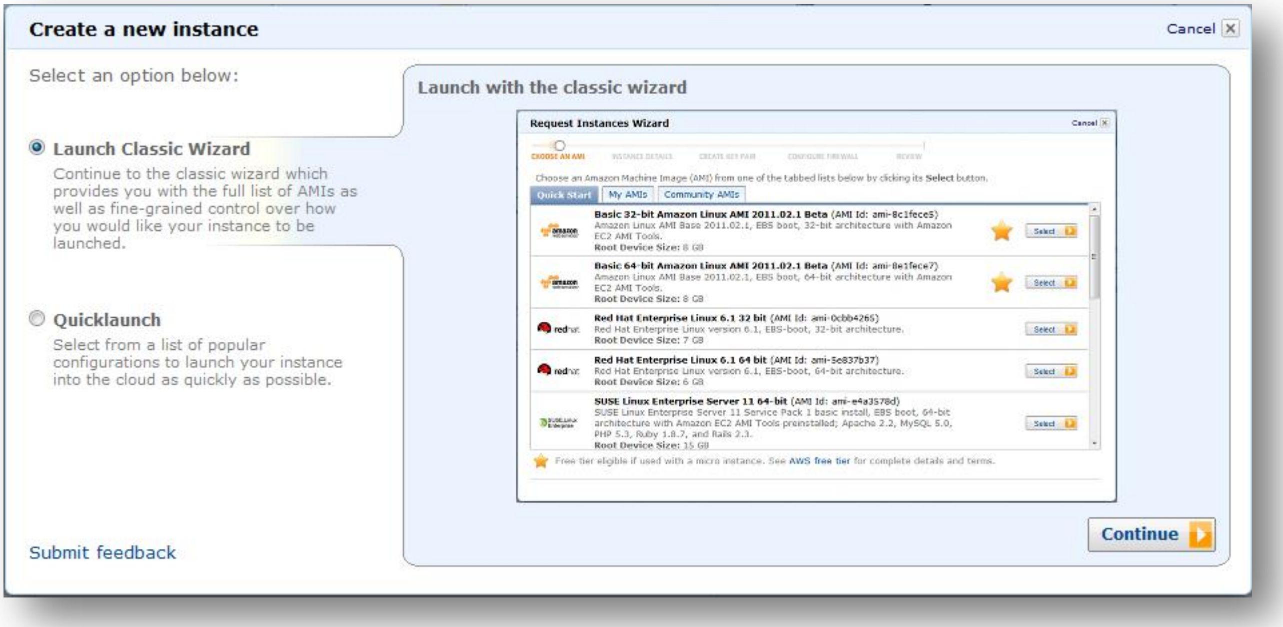


To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US East (Virginia) region.

Current Status	Details
✓ Amazon EC2 (US East - N. Virginia)	Service is operating normally

Select **Launch Classic Wizard** and click **Continue**



Select an option below:

● Launch Classic Wizard
Continue to the classic wizard which provides you with the full list of AMIs as well as fine-grained control over how you would like your instance to be launched.

○ Quicklaunch
Select from a list of popular configurations to launch your instance into the cloud as quickly as possible.

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Basic 32-bit Amazon Linux AMI 2011.02.1 Beta (AMI Id: ami-8c1fece5)
Amazon Linux AMI Base 2011.02.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools.
Root Device Size: 8 GB

Basic 64-bit Amazon Linux AMI 2011.02.1 Beta (AMI Id: ami-8e1fece7)
Amazon Linux AMI Base 2011.02.1, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools.
Root Device Size: 8 GB

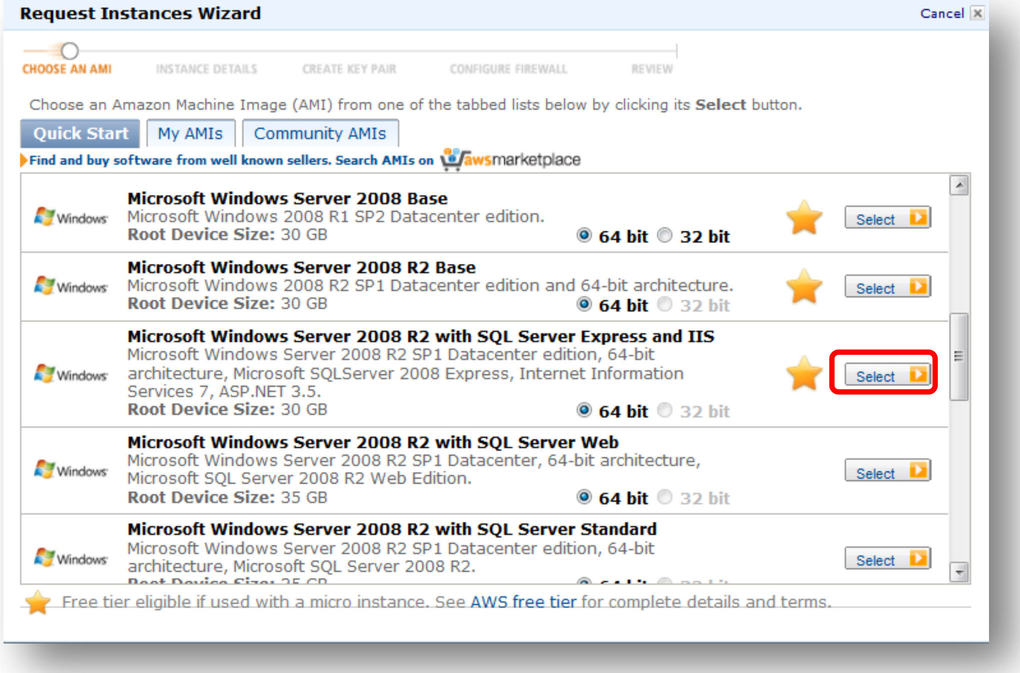
Red Hat Enterprise Linux 6.1 32 bit (AMI Id: ami-0cbb4265)
Red Hat Enterprise Linux version 6.1, EBS-boot, 32-bit architecture.
Root Device Size: 7 GB

Red Hat Enterprise Linux 6.1 64 bit (AMI Id: ami-5e837b37)
Red Hat Enterprise Linux version 6.1, EBS-boot, 64-bit architecture.
Root Device Size: 6 GB

SUSE Linux Enterprise Server 11 64-bit (AMI Id: ami-e4a3578d)
SUSE Linux Enterprise Server 11 Service Pack 1 basic install, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.0, PHP 5.3, Ruby 1.8.7, and Rails 2.3.
Root Device Size: 15 GB

★ Free tier eligible if used with a micro instance. See AWS free tier for complete details and terms.

Scroll down and select **Microsoft Windows Server 2008 R2 with SQL Server Express and IIS**



Request Instances Wizard Cancel ☒

CHOOSE AN AMI — INSTANCE DETAILS — CREATE KEY PAIR — CONFIGURE FIREWALL — REVIEW

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Quick Start | My AMIs | Community AMIs

Find and buy software from well known sellers. Search AMIs on awsmarketplace

Microsoft Windows Server 2008 Base
Microsoft Windows 2008 R1 SP2 Datacenter edition.
Root Device Size: 30 GB ● 64 bit ○ 32 bit — Select

Microsoft Windows Server 2008 R2 Base
Microsoft Windows 2008 R2 SP1 Datacenter edition and 64-bit architecture.
Root Device Size: 30 GB ● 64 bit ○ 32 bit — Select

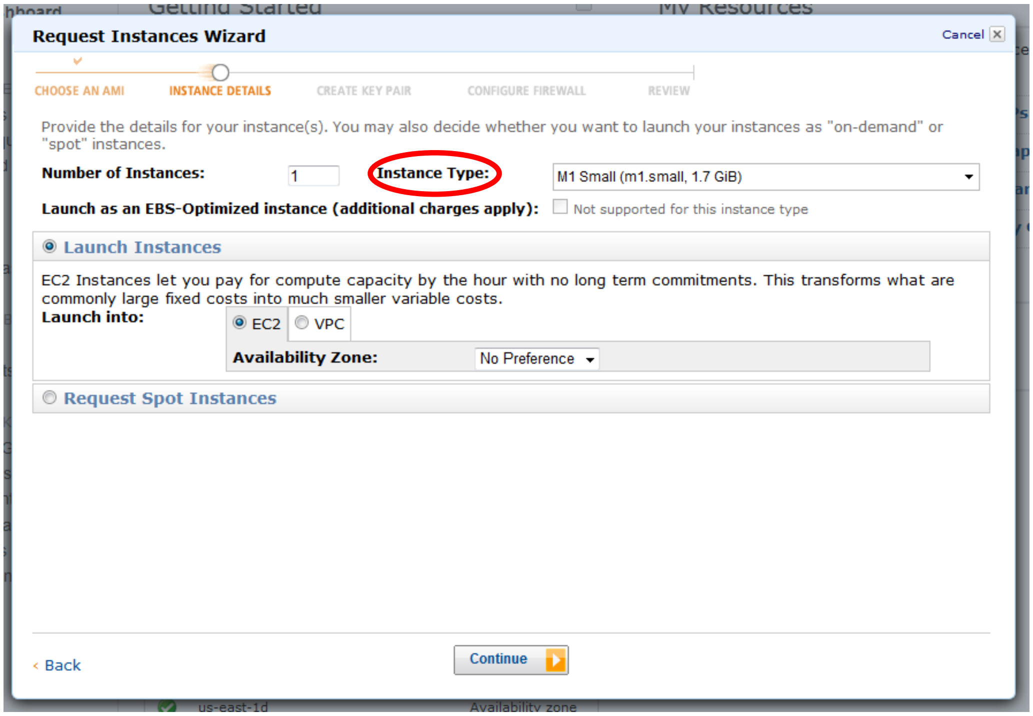
Microsoft Windows Server 2008 R2 with SQL Server Express and IIS
Microsoft Windows Server 2008 R2 SP1 Datacenter edition, 64-bit architecture, Microsoft SQLServer 2008 Express, Internet Information Services 7, ASP.NET 3.5.
Root Device Size: 30 GB ● 64 bit ○ 32 bit — Select

Microsoft Windows Server 2008 R2 with SQL Server Web
Microsoft Windows Server 2008 R2 SP1 Datacenter, 64-bit architecture, Microsoft SQL Server 2008 R2 Web Edition.
Root Device Size: 35 GB ● 64 bit ○ 32 bit — Select

Microsoft Windows Server 2008 R2 with SQL Server Standard
Microsoft Windows Server 2008 R2 SP1 Datacenter edition, 64-bit architecture, Microsoft SQL Server 2008 R2.
Root Device Size: 35 GB — Select

Free tier eligible if used with a micro instance. See AWS free tier for complete details and terms.

Select M1 Small for the instance type, and let the system choose an availability zone (Microsoft does not recommend running Windows with the 613 MB of memory allocated to micro instances).



Request Instances Wizard Cancel ☒

CHOOSE AN AMI — INSTANCE DETAILS — CREATE KEY PAIR — CONFIGURE FIREWALL — REVIEW

Provide the details for your instance(s). You may also decide whether you want to launch your instances as "on-demand" or "spot" instances.

Number of Instances: 1 **Instance Type:** M1 Small (m1.small, 1.7 GiB)

Launch as an EBS-Optimized instance (additional charges apply): □ Not supported for this instance type

● **Launch Instances**

EC2 Instances let you pay for compute capacity by the hour with no long term commitments. This transforms what are commonly large fixed costs into much smaller variable costs.

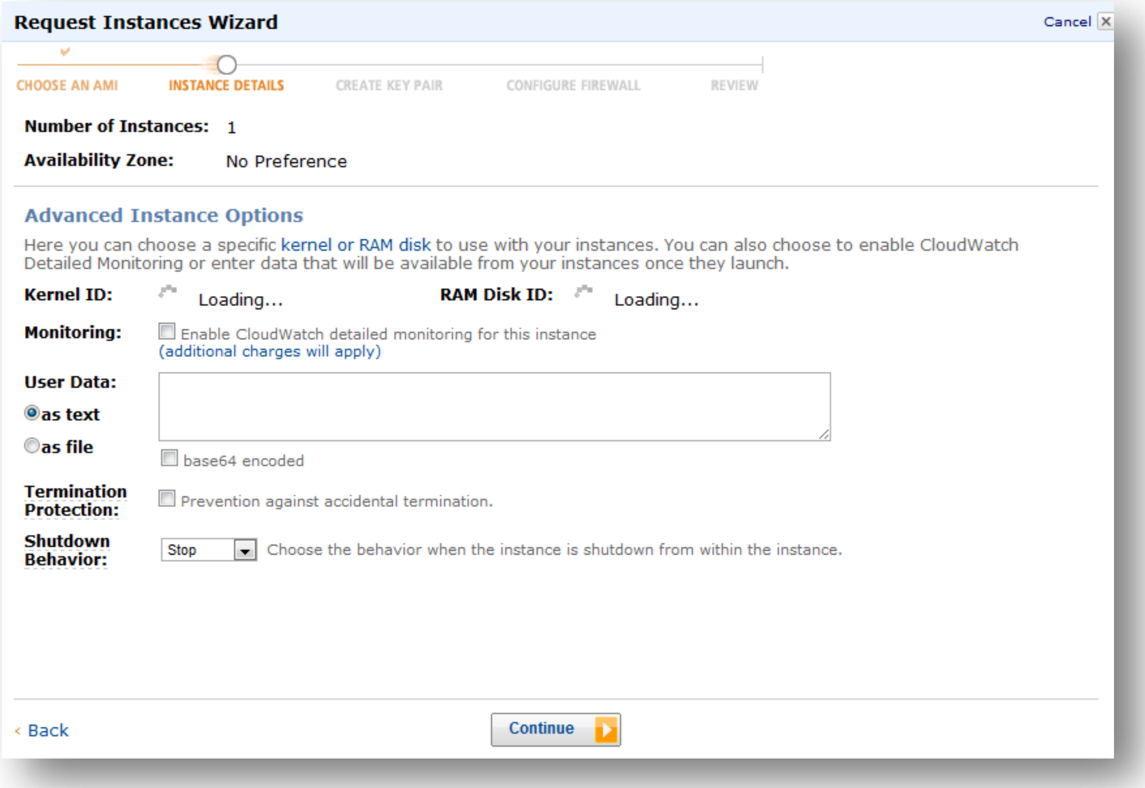
Launch into: ● EC2 ○ VPC

Availability Zone: No Preference

○ **Request Spot Instances**

< Back | Continue

Also accept the defaults on the next screen by clicking **Continue**:



Request Instances Wizard

Number of Instances: 1

Availability Zone: No Preference

Advanced Instance Options

Here you can choose a specific kernel or RAM disk to use with your instances. You can also choose to enable CloudWatch Detailed Monitoring or enter data that will be available from your instances once they launch.

Kernel ID: Loading... **RAM Disk ID:** Loading...

Monitoring: □ Enable CloudWatch detailed monitoring for this instance (additional charges will apply)

User Data:

● **as text**

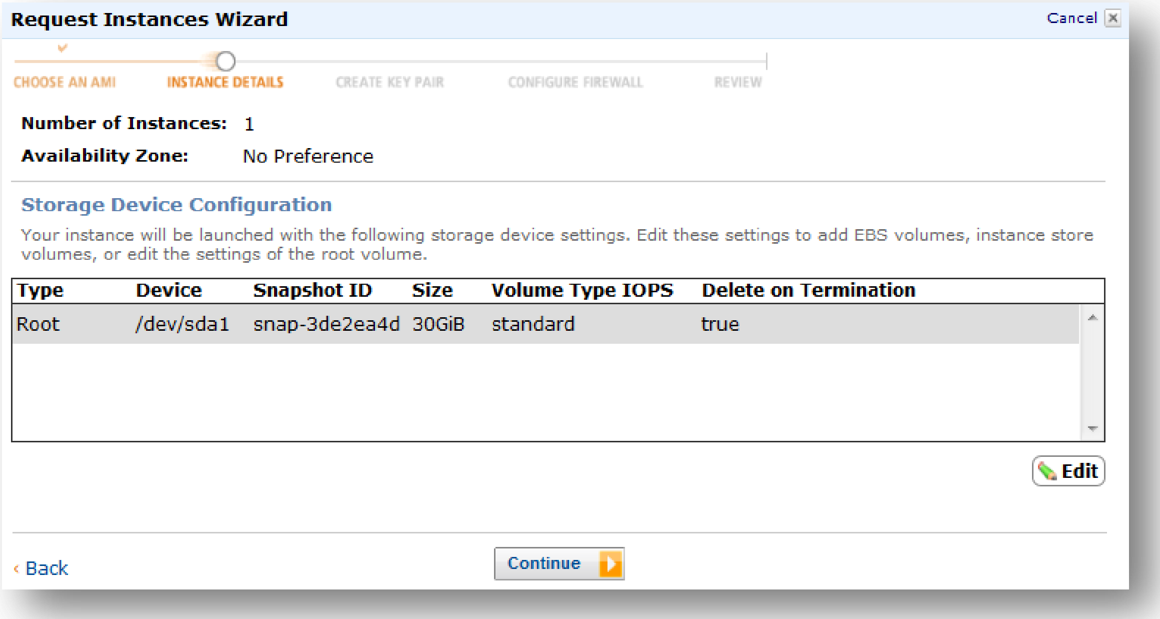
○ **as file**

□ base64 encoded

Termination Protection: □ Prevention against accidental termination.

Shutdown Behavior: Stop Choose the behavior when the instance is shutdown from within the instance.

Click **Continue** to accept the default Storage Device Configuration.



Request Instances Wizard

Number of Instances: 1

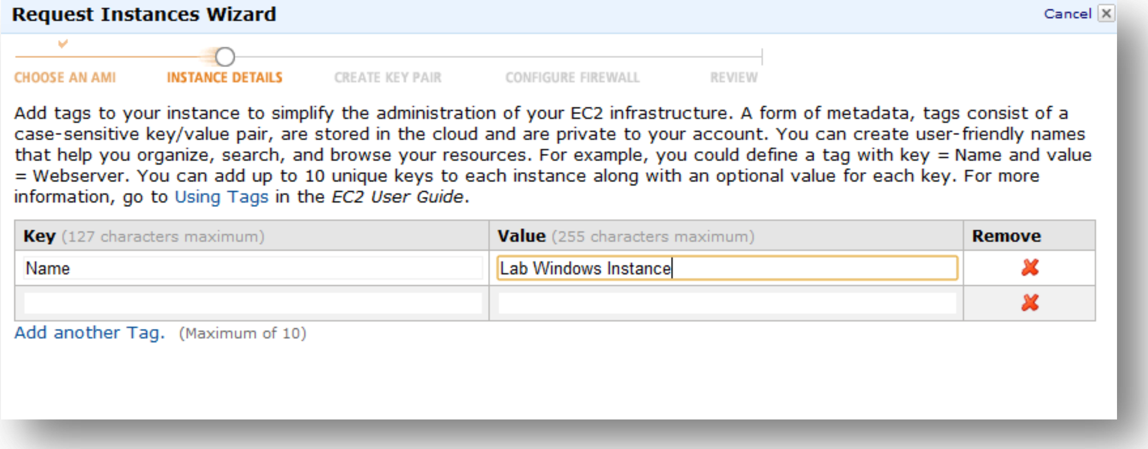
Availability Zone: No Preference

Storage Device Configuration

Your instance will be launched with the following storage device settings. Edit these settings to add EBS volumes, instance store volumes, or edit the settings of the root volume.

Type	Device	Snapshot ID	Size	Volume Type	IOPS	Delete on Termination
Root	/dev/sda1	snap-3de2ea4d	30GiB	standard		true

Name the instance (e.g. Lab Windows Instance) if you wish, and click **Continue**.



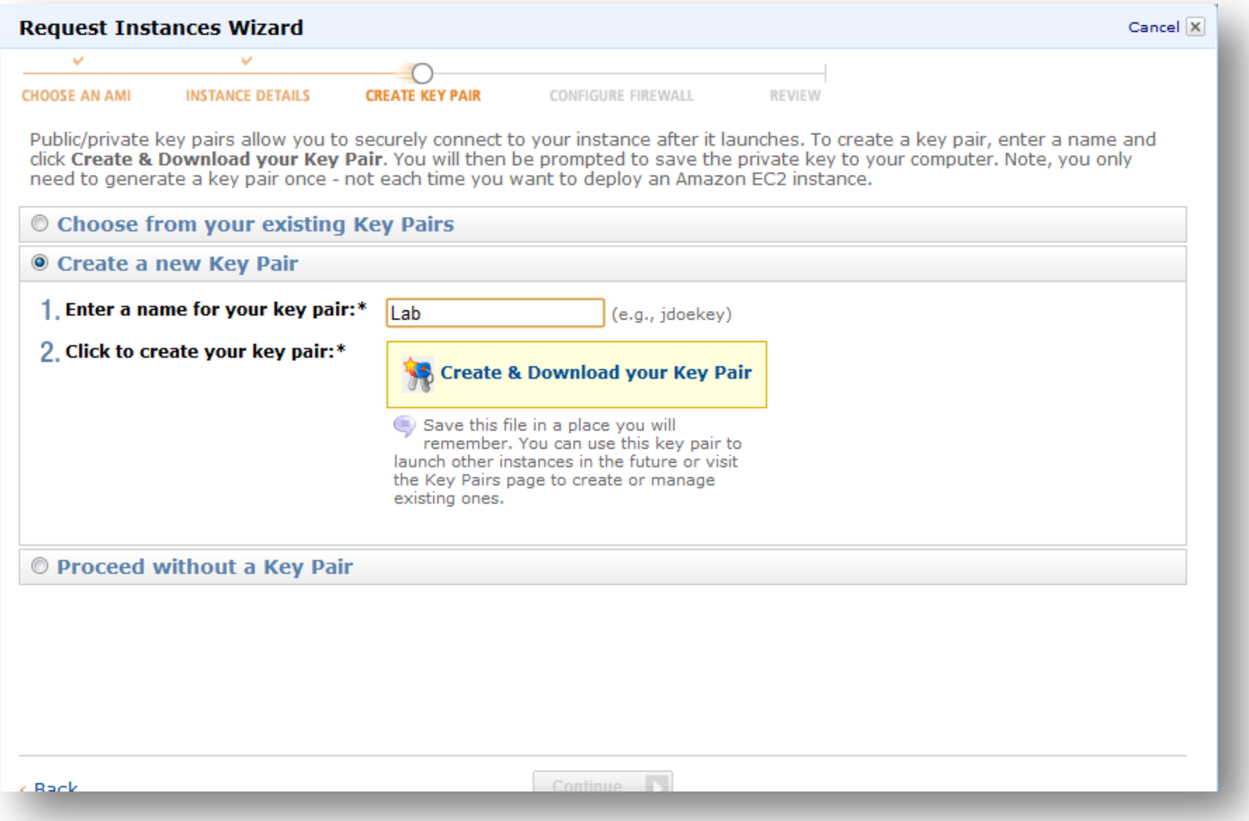
Request Instances Wizard

Add tags to your instance to simplify the administration of your EC2 infrastructure. A form of metadata, tags consist of a case-sensitive key/value pair, are stored in the cloud and are private to your account. You can create user-friendly names that help you organize, search, and browse your resources. For example, you could define a tag with key = Name and value = Webserver. You can add up to 10 unique keys to each instance along with an optional value for each key. For more information, go to Using Tags in the *EC2 User Guide*.

Key (127 characters maximum)	**Value** (255 characters maximum)	**Remove**
Name	Lab Windows Instance	✗
		✗

Add another Tag. (Maximum of 10)

Then create a key pair, if one does not already exist on your local hard drive, and download it to c:\ec2. Per the example below, we named the key pair “Lab” in this example.   Be certain to create or select a key pair, because it’s the only way to retrieve the default Administrator password.



Request Instances Wizard

Public/private key pairs allow you to securely connect to your instance after it launches. To create a key pair, enter a name and click **Create & Download your Key Pair**. You will then be prompted to save the private key to your computer. Note, you only need to generate a key pair once - not each time you want to deploy an Amazon EC2 instance.

○ Choose from your existing Key Pairs

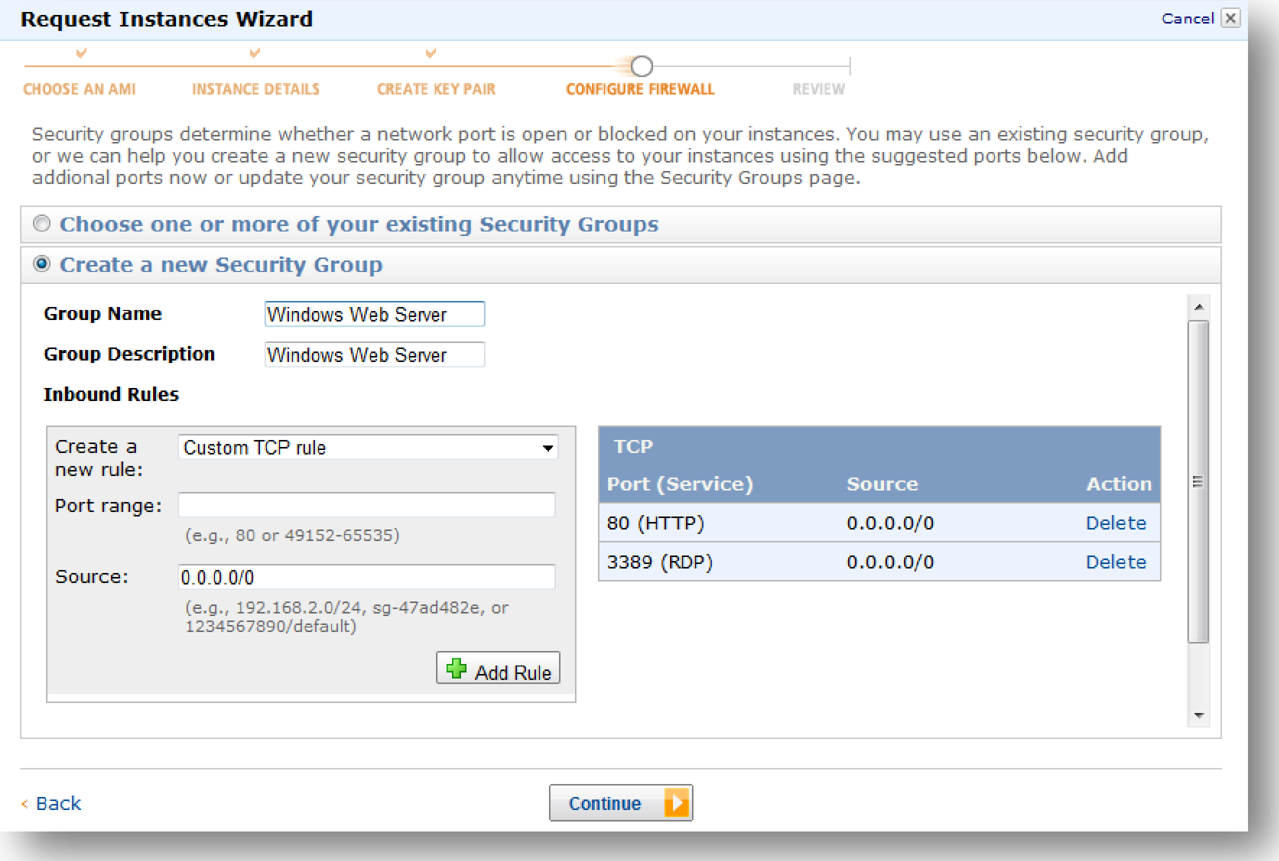
● Create a new Key Pair

1. **Enter a name for your key pair:*** Lab (e.g., jdoekey)
2. **Click to create your key pair:*** Create & Download your Key Pair

Save this file in a place you will remember. You can use this key pair to launch other instances in the future or visit the Key Pairs page to create or manage existing ones.

○ Proceed without a Key Pair

Create a security group with the settings below. Each of these choices is pre-defined in the drop-down list on the left. Click “Add Rule” to add them one by one.



Request Instances Wizard

Security groups determine whether a network port is open or blocked on your instances. You may use an existing security group, or we can help you create a new security group to allow access to your instances using the suggested ports below. Add addional ports now or update your security group anytime using the Security Groups page.

○ Choose one or more of your existing Security Groups

● Create a new Security Group

Group Name Windows Web Server

Group Description Windows Web Server

Inbound Rules

Create a new rule: Custom TCP rule

Port range:

(e.g., 80 or 49152-65535)

Source: 0.0.0.0/0

(e.g., 192.168.2.0/24, sg-47ad482e, or 1234567890/default)

TCP

Port (Service)	Source	Action
80 (HTTP)	0.0.0.0/0	Delete
3389 (RDP)	0.0.0.0/0	Delete

Then launch the instance. Wait for 10-15 minutes for the Windows instance to initialize. This is required for Windows to allow sysprep to run, a random Administrator password to be created for you, and for Windows to initialize the first time.

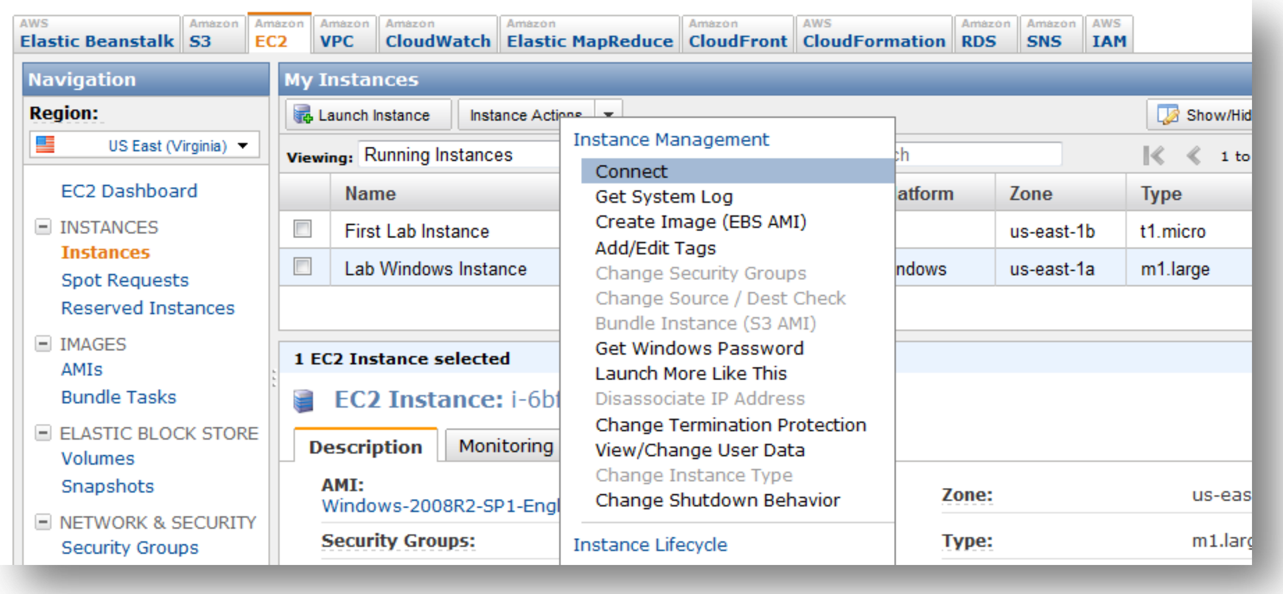
Set Up Windows

About Windows

Amazon provided Windows instances automatically generated a random Administrator password the first time an instance is launched. This random password is encrypted using the public key specified at launch, and can only be retrieved after the instance has first booted. Once the instance is rebooted for the first time, this Administrator password can no longer be retrieved.

Connecting to Windows Wizard

In the AWS Console, select the running Windows instance, then right-click and choose "**Connect**".



Viewing: Running Instances

Name	atform	Zone	Type
First Lab Instance		us-east-1b	t1.micro
Lab Windows Instance	ndows	us-east-1a	m1.large

1 EC2 Instance selected

EC2 Instance: i-6bt

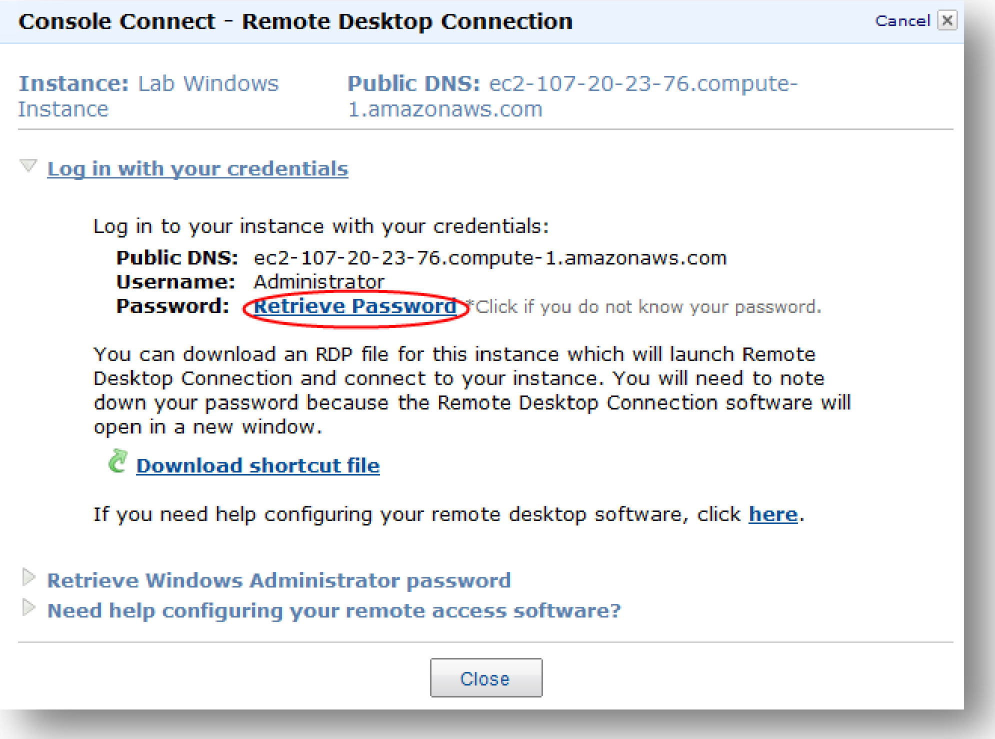
AMI: Windows-2008R2-SP1-Engl

Security Groups:

Zone: us-eas

Type: m1.larg

Click on **Retrieve Password**. If you launched 15-30 minutes ago and you see a message that says "Windows password not available yet", terminate the instance and launch a new one.



Console Connect - Remote Desktop Connection

Instance: Lab Windows Instance

Public DNS: ec2-107-20-23-76.compute-1.amazonaws.com

▽ Log in with your credentials

Log in to your instance with your credentials:

Public DNS: ec2-107-20-23-76.compute-1.amazonaws.com
Username: Administrator
Password: Retrieve Password *Click if you do not know your password.

You can download an RDP file for this instance which will launch Remote Desktop Connection and connect to your instance. You will need to note down your password because the Remote Desktop Connection software will open in a new window.

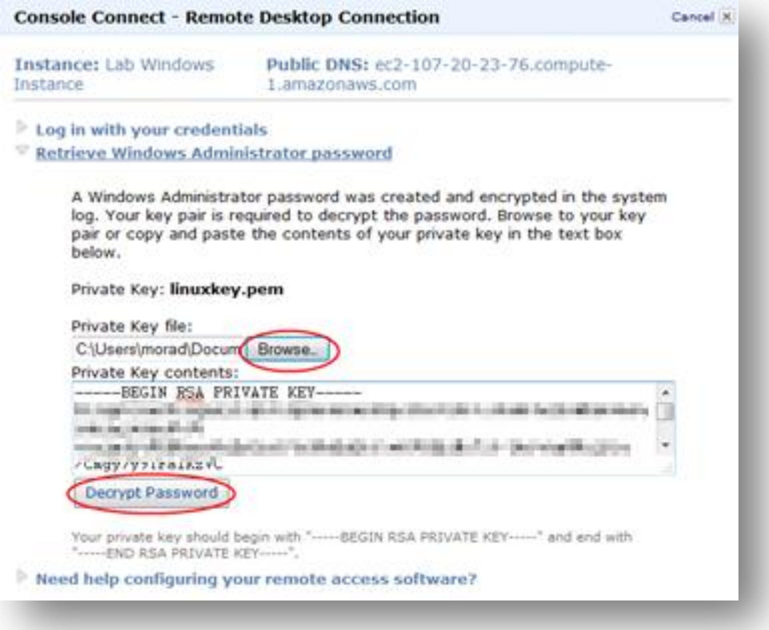
Download shortcut file

If you need help configuring your remote desktop software, click **here**.

▷ Retrieve Windows Administrator password

▷ Need help configuring your remote access software?

Click on “Browse”, locate your keypair that you downloaded. Use the .pem file extension.



Console Connect - Remote Desktop Connection

Instance: Lab Windows Instance

Public DNS: ec2-107-20-23-76.compute-1.amazonaws.com

Log in with your credentials
Retrieve Windows Administrator password

A Windows Administrator password was created and encrypted in the system log. Your key pair is required to decrypt the password. Browse to your key pair or copy and paste the contents of your private key in the text box below.

Private Key: **linuxkey.pem**

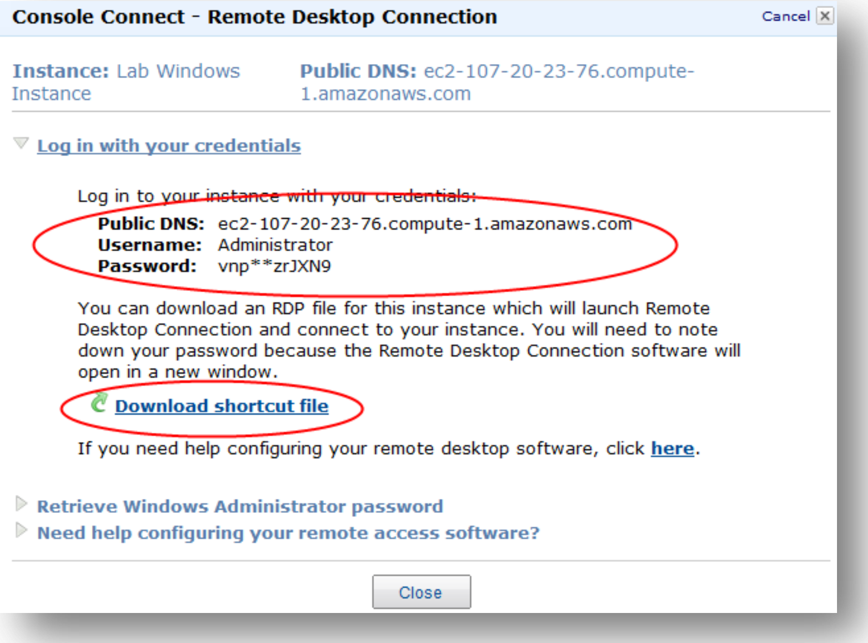
Private Key file:
C:\Users\morad\Docum

Private Key contents:

```
------BEGIN RSA PRIVATE KEY------
[redacted]
/Cagy/y7ifaikzvL
```

Your private key should begin with "-----BEGIN RSA PRIVATE KEY-----" and end with "-----END RSA PRIVATE KEY-----".

Make a note of the login information and click on **Download shortcut file**. Open or save & launch the shortcut and use the decrypted password to log into the Windows Instance as Administrator.



Console Connect - Remote Desktop Connection

Instance: Lab Windows Instance

Public DNS: ec2-107-20-23-76.compute-1.amazonaws.com

Log in to your instance with your credentials:

Public DNS: ec2-107-20-23-76.compute-1.amazonaws.com
Username: Administrator
Password: vnp**zrJXN9

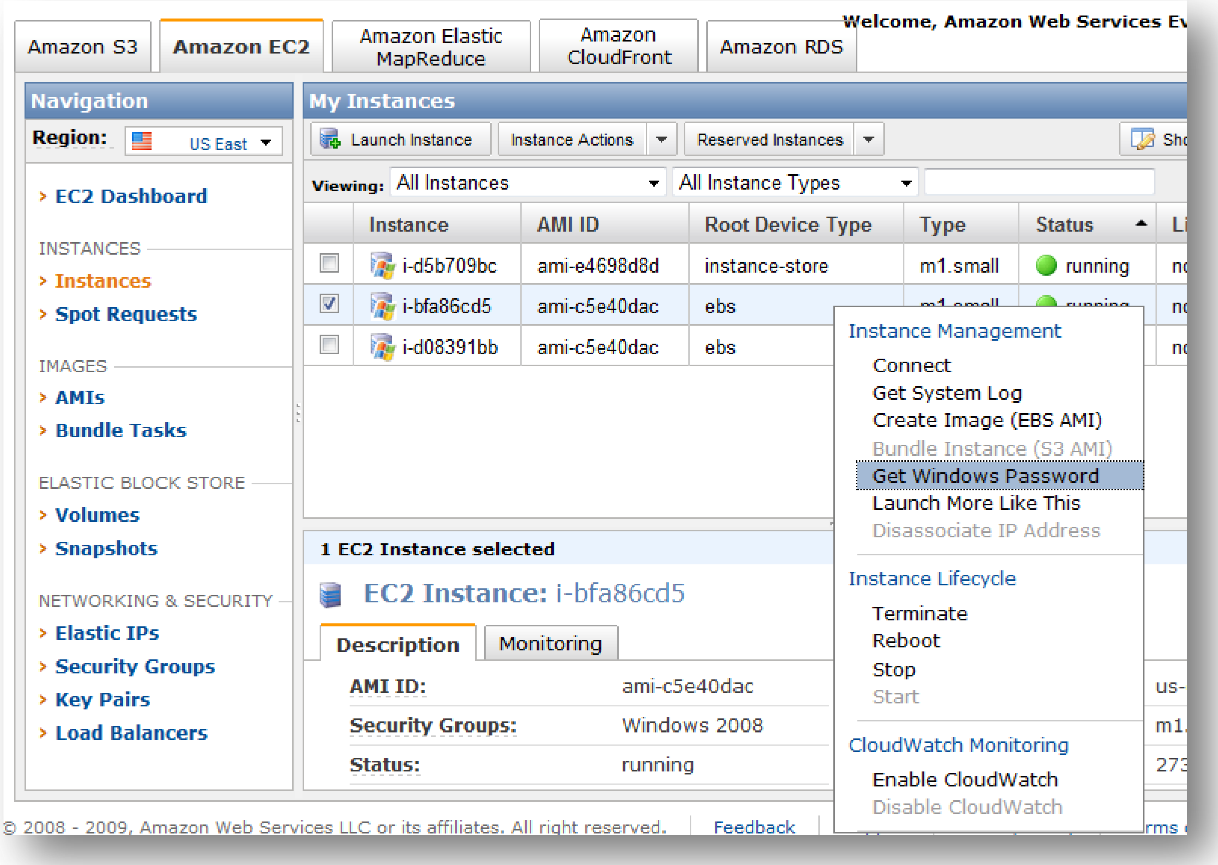
You can download an RDP file for this instance which will launch Remote Desktop Connection and connect to your instance. You will need to note down your password because the Remote Desktop Connection software will open in a new window.

If you need help configuring your remote desktop software, click **here**.

Retrieve Windows Administrator password
Need help configuring your remote access software?
Close

Manually Retrieve the Windows Administrator Password

In the AWS Console, you can manually retrieve the Windows Administrator password by selecting the running Windows instance, then right-click and choose “Get Windows Password”. If you launched 15-30 minutes ago and you see a message that says "Windows password not available yet", terminate the instance and launch a new one.



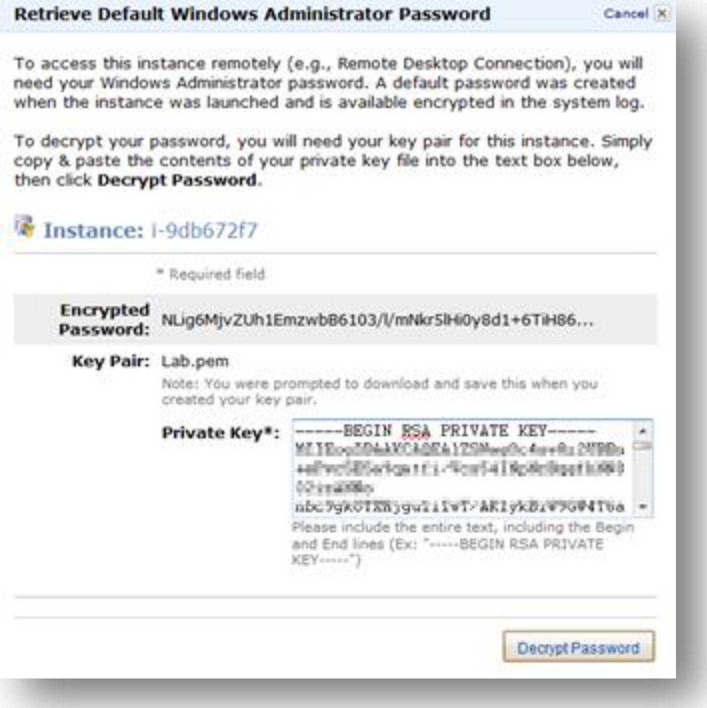
	Instance	AMI ID	Root Device Type	Type	Status	Li
□	i-d5b709bc	ami-e4698d8d	instance-store	m1.small	● running	nc
☑	i-bfa86cd5	ami-c5e40dac	ebs	m1.small	● running	nc
□	i-d08391bb	ami-c5e40dac	ebs			nc

AMI ID: ami-c5e40dac

Security Groups: Windows 2008

Status: running

Paste in the contents of the keypair that you downloaded. Use the .pem file extension.



To access this instance remotely (e.g., Remote Desktop Connection), you will need your Windows Administrator password. A default password was created when the instance was launched and is available encrypted in the system log.

To decrypt your password, you will need your key pair for this instance. Simply copy & paste the contents of your private key file into the text box below, then click **Decrypt Password**.

Instance: i-9db672f7

* Required field

Encrypted Password: NLig6MjvZUh1EmzwbB6103/l/mNkr5lHi0y8d1+6TiH86...

Key Pair: Lab.pem

Note: You were prompted to download and save this when you created your key pair.

Private Key*:

```
-----BEGIN RSA PRIVATE KEY-----
[redacted]
```

Please include the entire text, including the Begin and End lines (Ex: "-----BEGIN RSA PRIVATE KEY-----")

Manually Connect to the Instance Using Windows Remote Desktop

Click on Start -> Run and type in *mstsc*, which will start your local Microsoft Remote Desktop client. The server address will be the public DNS address of the server, which you can copy from the AWS Console. Once you've retrieved your password and logged in, we suggest changing the Administrator password to something more memorable – or at least writing it down. If you decide to stop the server and then restart it again later, there is no way to retrieve the password again.

Configure the default Website

This AMI has already been configured with IIS installed and running. Modify the web server by using Notepad to create the following Default.asp file:

Create this file:

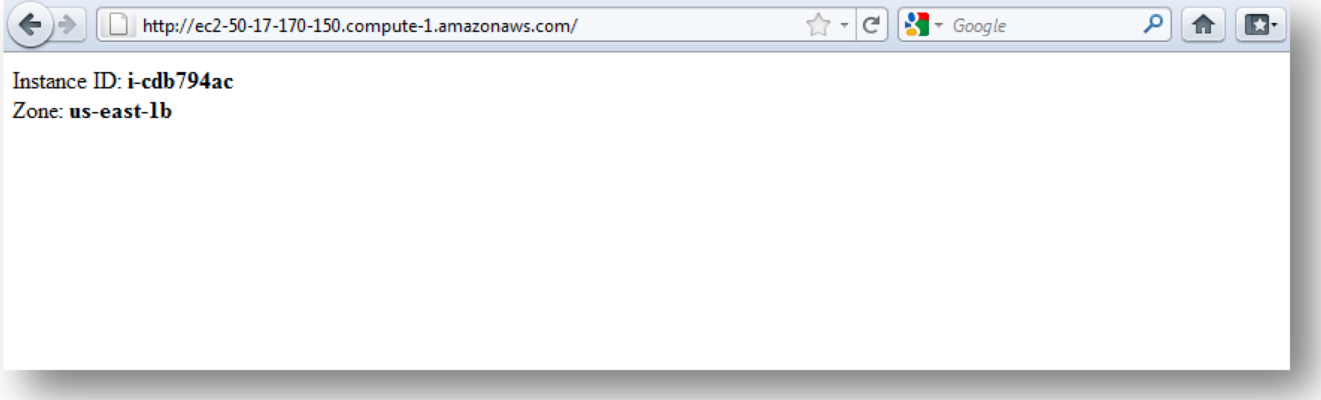
```
C:\inetpub\wwwroot\Default.asp
```

With this content:

```
<%
set xmlhttp = CreateObject("MSXML2.ServerXMLHTTP")
url = "http://169.254.169.254/latest/meta-data/instance-id"
xmlhttp.open "GET", url, false
xmlhttp.send ""
strHTML = xmlhttp.responseText
Response.Write("Instance ID: <b>" & strHTML & "</b><br/>")
url = "http://169.254.169.254/latest/meta-data/placement/availability-zone"
xmlhttp.open "GET", url, false
xmlhttp.send ""
strHTML = xmlhttp.responseText
Response.Write("Zone: <b>" & strHTML & "</b><br/>")
set xmlhttp = nothing
%>
```

Connect to the web server

Enter the DNS name into the browser and connect to the server (if the default IIS 7 page displays instead of something similar to the screenshot below, make sure the Default.asp file was not saved with a .txt extension by Notepad).

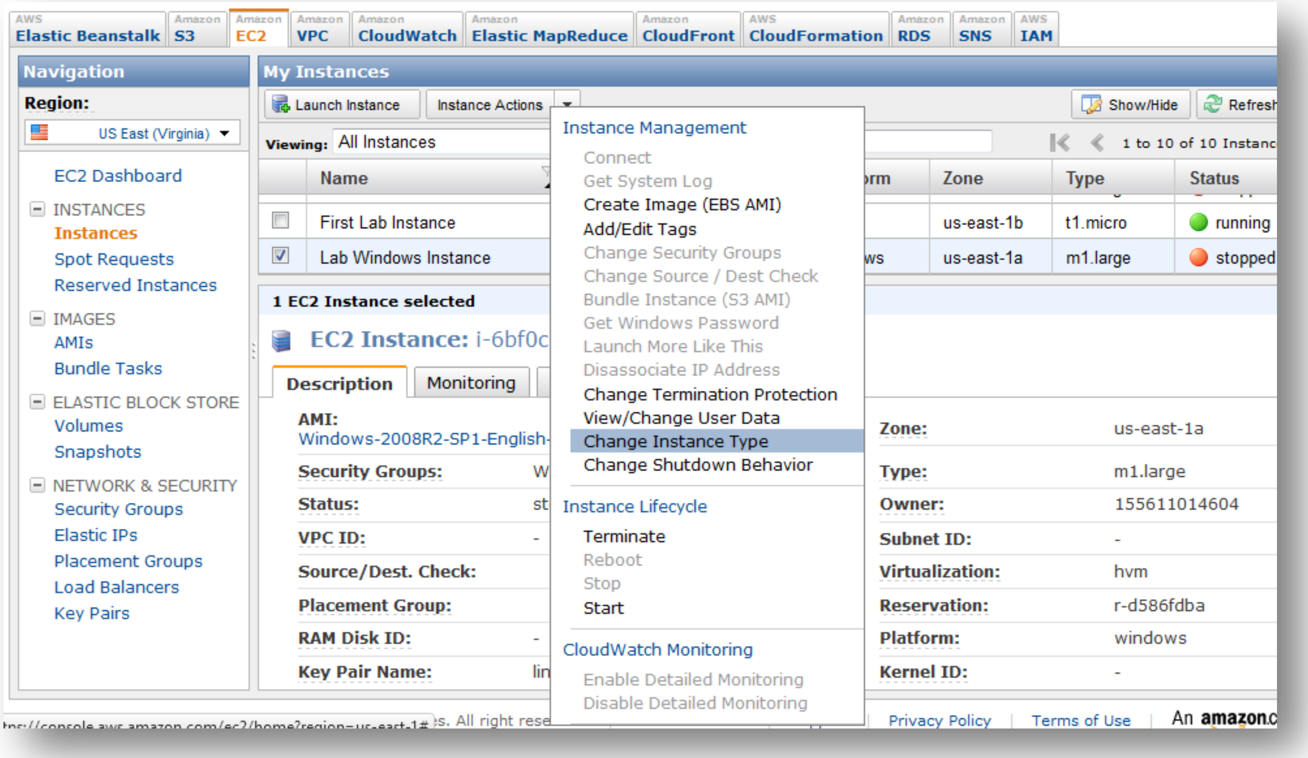


Instance ID: **i-cdb794ac**
Zone: **us-east-1b**

Change the Instance Type

Did you know that you can change the instance type that an AMI is running on? This only works with EBS-backed instances (what we're running here). There is no particular reason to change the instance type in this lab, but the following steps outline how easy it is to do in AWS.

In the AWS Console, select your lab instance, then right-click on it and stop (NOT terminate!) the instance. After it has stopped, right-click on it again and select "Change Instance Type"



	Name	…rm	Zone	Type	Status
□	First Lab Instance		us-east-1b	t1.micro	● running
☑	Lab Windows Instance	ws	us-east-1a	m1.large	● stopped

1 EC2 Instance selected

EC2 Instance: i-6bf0c

AMI: Windows-2008R2-SP1-English-		Zone:	us-east-1a
Security Groups:	W	Type:	m1.large
Status:	st	Owner:	155611014604
VPC ID:	-	Subnet ID:	-
Source/Dest. Check:		Virtualization:	hvm
Placement Group:		Reservation:	r-d586fdba
RAM Disk ID:	-	Platform:	windows
Key Pair Name:	lin	Kernel ID:	-

After going through the options and selecting your new instance type, right-click your lab instance and start it again.

Alternatively, you can use the EC2 command-line to script this change with the following command:

```
    ec2-modify-instance-attribute <instance_id> -t <instance_type>
```

For example:

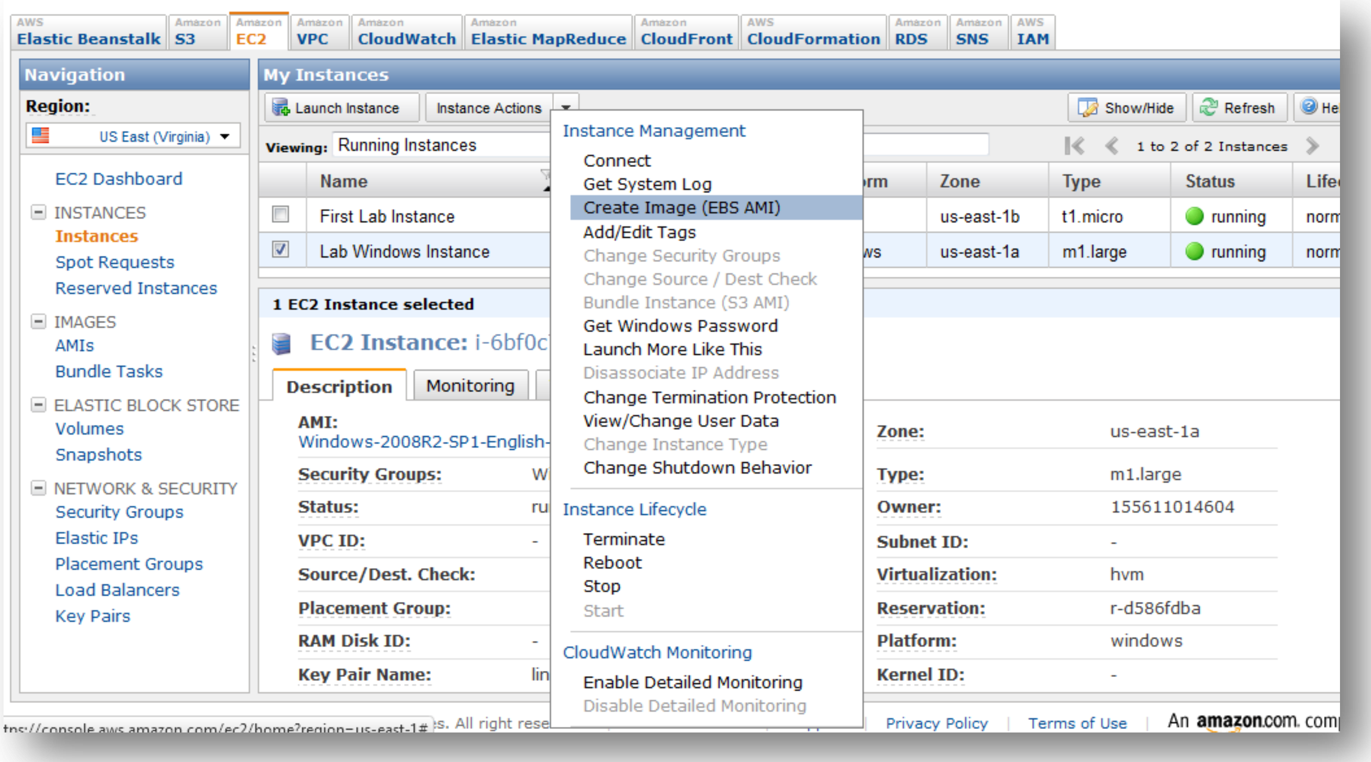
```
    ec2-modify-instance-attribute i-c1202cad -t m1.small
```

Create a Custom AMI

We now have a fairly customized system, so we are going to create a custom AMI, visible only to us, that is a freeze-dried copy of what's running now. Then when we launch a new server, it will be preconfigured with all the changes that we've made.

Bundle the Image

In the AWS Console, right-click on the instance and choose "Create Image (EBS AMI)".



	Name	rm	Zone	Type	Status	Life
☐	First Lab Instance		us-east-1b	t1.micro	● running	norm
☑	Lab Windows Instance	ws	us-east-1a	m1.large	● running	norm

AMI: Windows-2008R2-SP1-English-

Security Groups: W

Status: ru

VPC ID: -

Source/Dest. Check:

Placement Group:

RAM Disk ID: -

Key Pair Name: lin

Zone: us-east-1a

Type: m1.large

Owner: 155611014604

Subnet ID: -

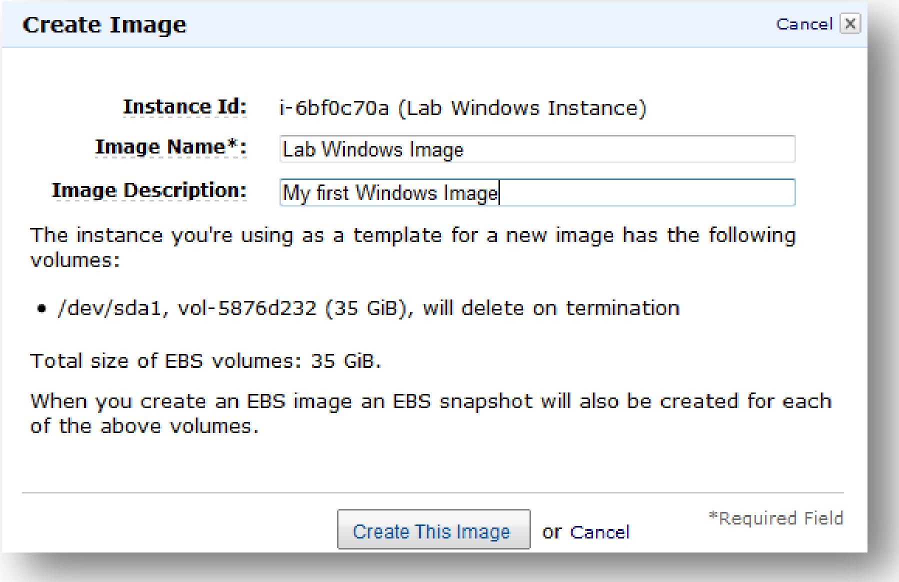
Virtualization: hvm

Reservation: r-d586fdba

Platform: windows

Kernel ID: -

Provide a name and image on the next screen, then click “Create This Image”. The instance will automatically be stopped (not terminated), and then a snapshot will be created. You’ll know when the process finishes, because the server will automatically restart and send you another email.



Instance Id: i-6bf0c70a (Lab Windows Instance)
Image Name*: Lab Windows Image
Image Description: My first Windows Image

The instance you're using as a template for a new image has the following volumes:

- /dev/sda1, vol-5876d232 (35 GiB), will delete on termination

Total size of EBS volumes: 35 GiB.

When you create an EBS image an EBS snapshot will also be created for each of the above volumes.

Note: If you use S3-backed images, the bundling process is significantly different. Accordingly, these instructions are only valid for EBS-backed images.

Once finished, there will be two new entries in the AWS Console. Under *Snapshots* you’ll see an entry for the snapshot (backup), and under AMIs owned by you there will be an AMI registered, based on the snapshot.

Note: it’s also possible to create a custom AMI from the command line with the `ec2-create-image` command. This command also gives you an advanced option to add a “`--no-reboot`” argument. It’s a very handy tool; however the “`--no-reboot`” option is not recommended for Windows instances because a shutdown ensures the most recent files have been written to the disk and the Windows file system does not get corrupted.

Test the instance

Before we terminate the already-running instance, let’s make certain that the new one works. In the AWS Console, click on AMIs and your image should be listed under “Owned By Me”. Launch the instance, using the same keypair and security group as before. Use a new name, such as “Second Windows Instance” in order that you can distinguish one from the other.

Make certain that both RDP and the Web Page work.

Terminate the Original Instance

Well, not quite yet. Note that we now have two web servers. So we already have a scalable application! And if your new server started in a different availability zone than the first one, you also have redundancy.

Now terminate the original server. The instance and its local file system will be recycled back into the cloud.

Assign a Fixed IP

How do you set up practical DNS names for your web server? Using an address such as http://ec2-75-101-197-112.compute-1.amazonaws.com/ is not likely to win the day with your customers. Setting up a DNS record that points to http://www.yourdomain.com is easy enough – until you reboot the server and the underlying DNS name and IP address both change.

AWS offers Elastic IP Addresses, which are actually NAT addresses that operate at a regional level. That is, an Elastic IP Address works across Availability Zones, within a single region.

Assign one to your application as follows:

- Click on the Elastic IPs link in the AWS Console
- Allocate a new address
- Associate the address with a running instance. If you change instances, it's as simple as allocating the address to the new instance.
- If you have a domain name you can create a DNS "A" record in your own DNS server that points tt.mydomain.com to <<your elastic IP>>.

Two Important Notes:

3. As long as an Elastic IP address is associated with a running instance, there is no charge for it. However an address that is not associated with a running instance costs $0.01/hour. This prevents address hoarding; however it also means that you need to delete any addresses you create, or you will incur an ongoing charge.
4. Load balancing (covered in the next section) requires CNAME records instead of "A" records. So Elastic IP is not required for load-balanced applications.

Appendix – Using Native Client to Connect to Linux Instances

Windows (PuTTY)

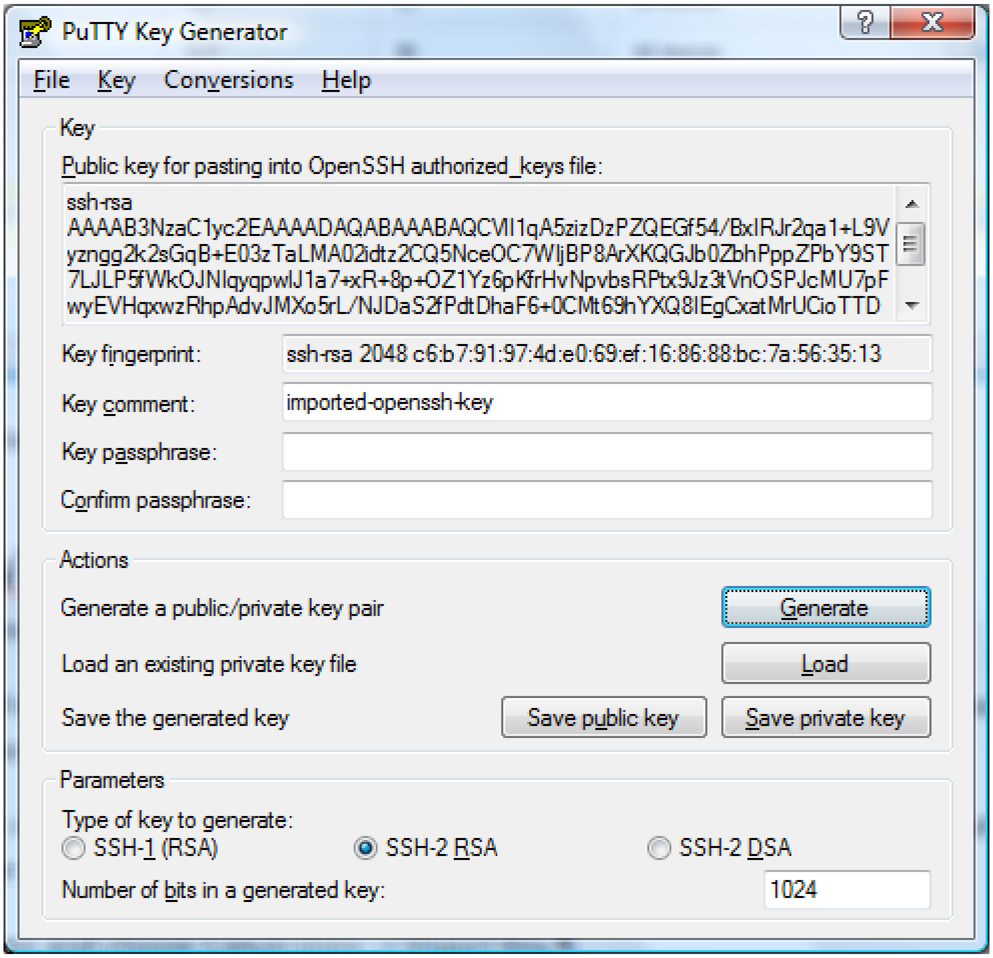
This is a Windows-only step, because other operating systems have SSH built in.

Download and install Putty. The single word “putty” in Google will return a list of download sites. Be certain that you install both Putty and PuttyGen, because you will need both.

Once installed, convert the key pair that you created when you launched the instance. Putty doesn’t understand the native key pair format.

Launch PuttyGen and choose Conversions -> Import Key.

Browse for Lab.pem, or whatever you named yours, and import the key. The result will look similar to this:



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABAQCVlI1qA5zizDzPZQEGf54/BxIRJr2qa1+L9V
yzngg2k2sGqB+E03zTaLMA02idtz2CQ5NceOC7WljBP8ArXKQGJb0ZbhPppZPbY9ST
7LJLP5fWkOJNlqyqpwlJ1a7+xR+8p+OZ1Yz6pKfrHvNpvbsRPtx9Jz3tVnOSPJcMU7pF
wyEVHqxwzRhpAdvJMXo5rL/NJDaS2fPdtDhaF6+0CMt69hYXQ8IEgCxatMrUCioTTD
```

Key fingerprint: ssh-rsa 2048 c6:b7:91:97:4d:e0:69:ef:16:86:88:bc:7a:56:35:13

Key comment: imported-openssh-key

Key passphrase:

Confirm passphrase:

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:
○ SSH-1 (RSA) ● SSH-2 RSA ○ SSH-2 DSA

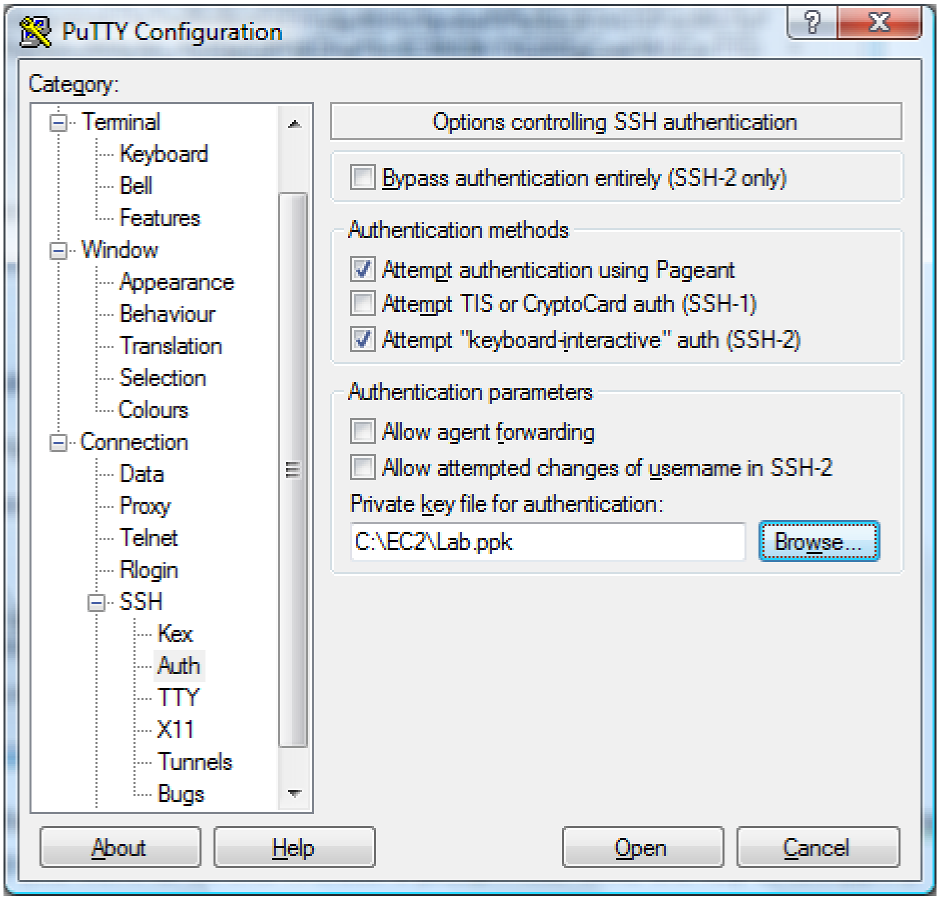
Number of bits in a generated key: 1024

Save the key as the same file name with a .ppk extension. Click on File -> Save as Private Key. Ignore the dialog that asks if you want to do this without a passphrase. Save the key as Lab.ppk.

Close PuttyGen.

Log in via SSH as follows:

Launch Putty, then expand the SSH node and select the Auth sub-node. Enter Lab.ppk as the key name (shown below).



Options controlling SSH authentication

□ Bypass authentication entirely (SSH-2 only)

Authentication methods

☑ Attempt authentication using Pageant

□ Attempt TIS or CryptoCard auth (SSH-1)

☑ Attempt "keyboard-interactive" auth (SSH-2)

Authentication parameters

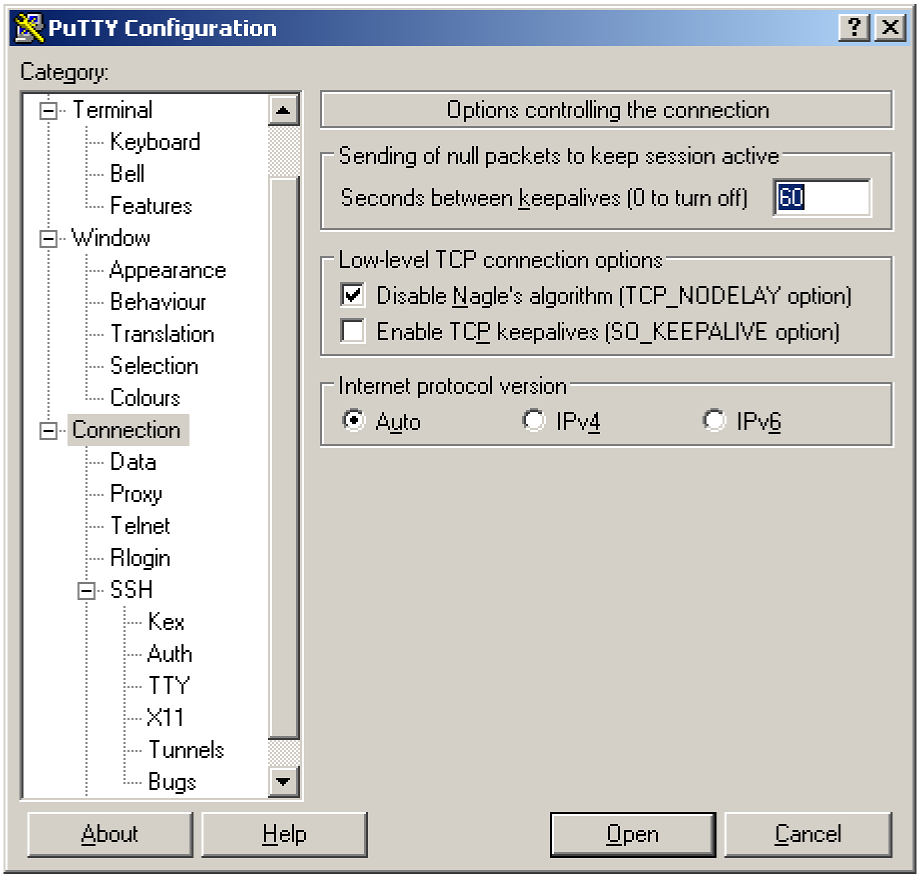
□ Allow agent forwarding

□ Allow attempted changes of username in SSH-2

Private key file for authentication:

C:\EC2\Lab.ppk

Make certain that *keepalive* has a value greater than zero. Otherwise your session will time out, which is annoying.



PuTTY Configuration

Options controlling the connection

Sending of null packets to keep session active

Seconds between keepalives (0 to turn off) 60

Low-level TCP connection options

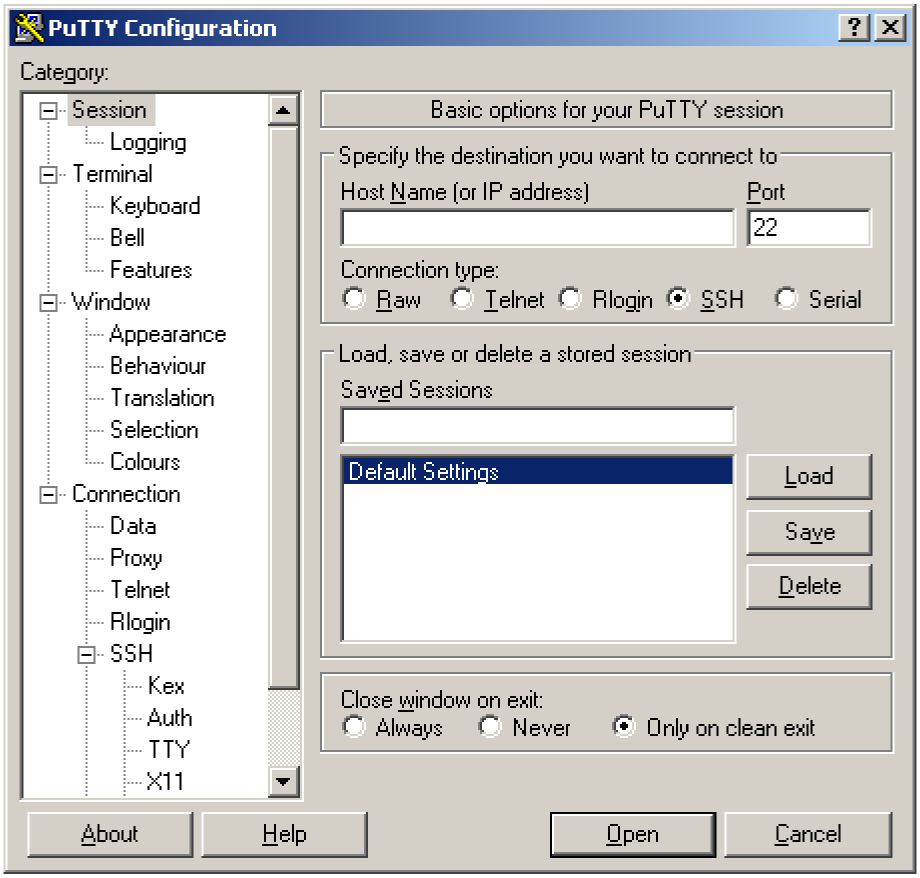
☑ Disable Nagle's algorithm (TCP_NODELAY option)

□ Enable TCP keepalives (SO_KEEPALIVE option)

Internet protocol version

● Auto ○ IPv4 ○ IPv6

At this point (before entering the host address in the next step), it's a good time to save the settings. You can either highlight *Default* and update the settings, or pick a new name such as *Lab*.



PuTTY Configuration

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address):

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

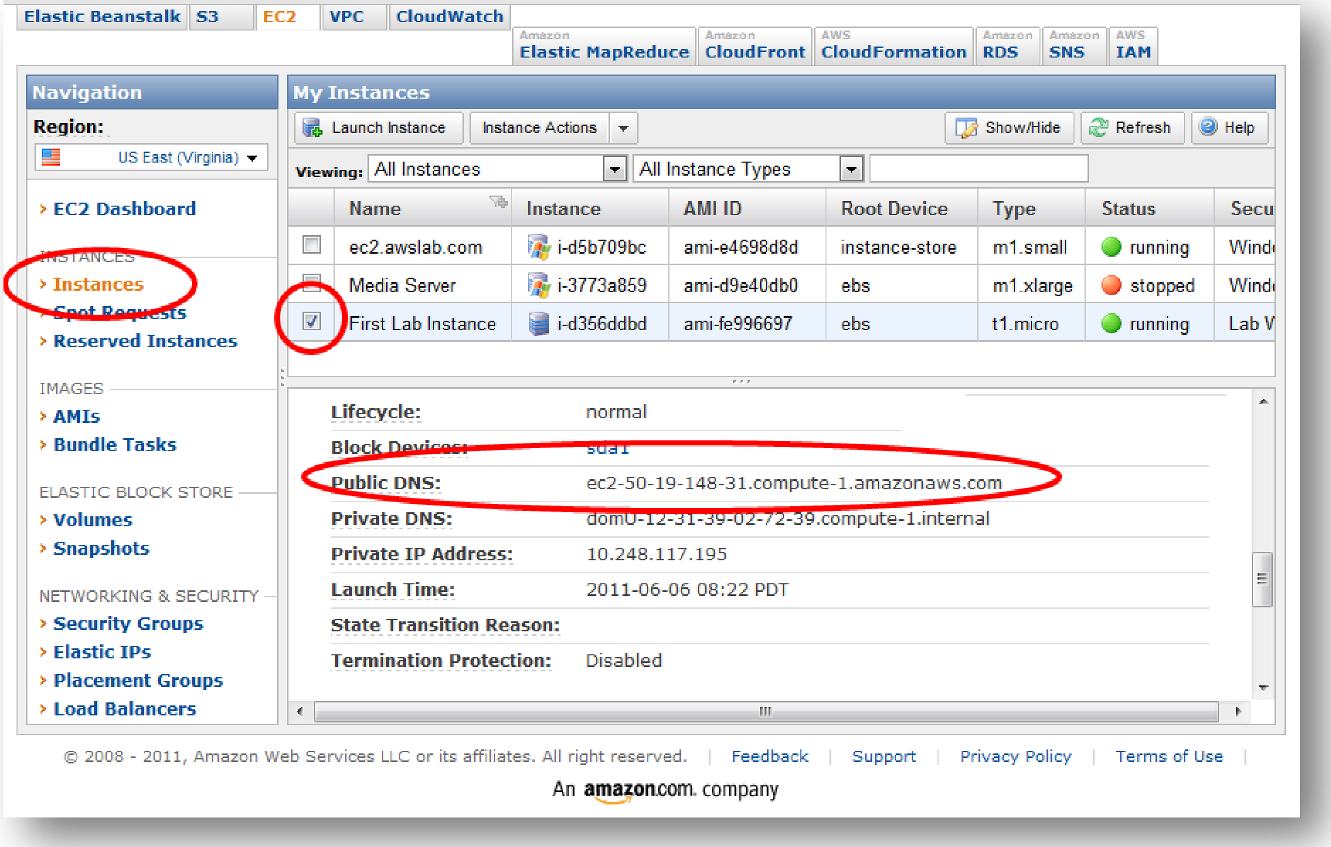
Load, save or delete a stored session

Saved Sessions:

Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

If you are not certain how to find the DNS name of the server; click on the running instance and look at the lower pane.



	Name	Instance	AMI ID	Root Device	Type	Status	Secu
☐	ec2.awslab.com	i-d5b709bc	ami-e4698d8d	instance-store	m1.small	● running	Wind
☐	Media Server	i-3773a859	ami-d9e40db0	ebs	m1.xlarge	● stopped	Wind
☑	First Lab Instance	i-d356ddbd	ami-fe996697	ebs	t1.micro	● running	Lab V

Lifecycle:	normal
Block Devices:	sda1
Public DNS:	ec2-50-19-148-31.compute-1.amazonaws.com
Private DNS:	domU-12-31-39-02-72-39.compute-1.internal
Private IP Address:	10.248.117.195
Launch Time:	2011-06-06 08:22 PDT
State Transition Reason:	
Termination Protection:	Disabled

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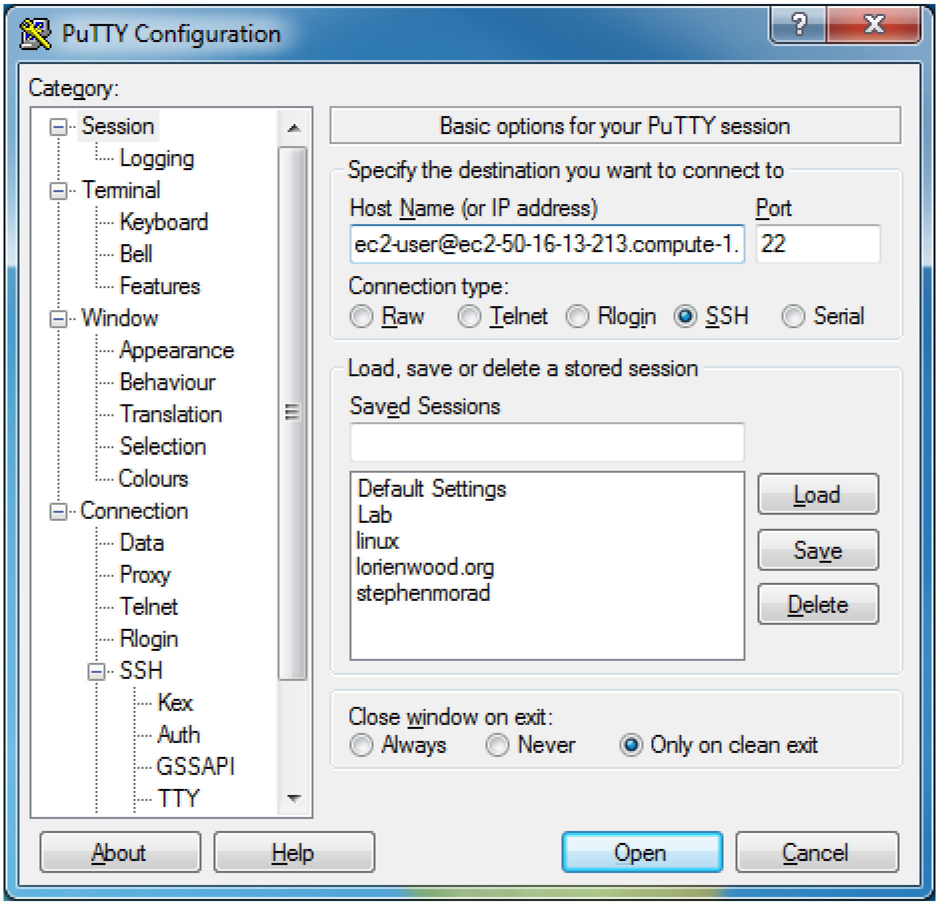
Find the Session node (top one in the list) and enter ec2-user@ followed by the DNS name of the running instance (you must initially login as “ec2-user” to Amazon Linux instances). Then click “Open” to connect. For example: ec2-user@ec2-50-16-13-213.compute-1.amazonaws.com



Specify the destination you want to connect to

Host Name (or IP address): ec2-user@ec2-50-16-13-213.compute-1.

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

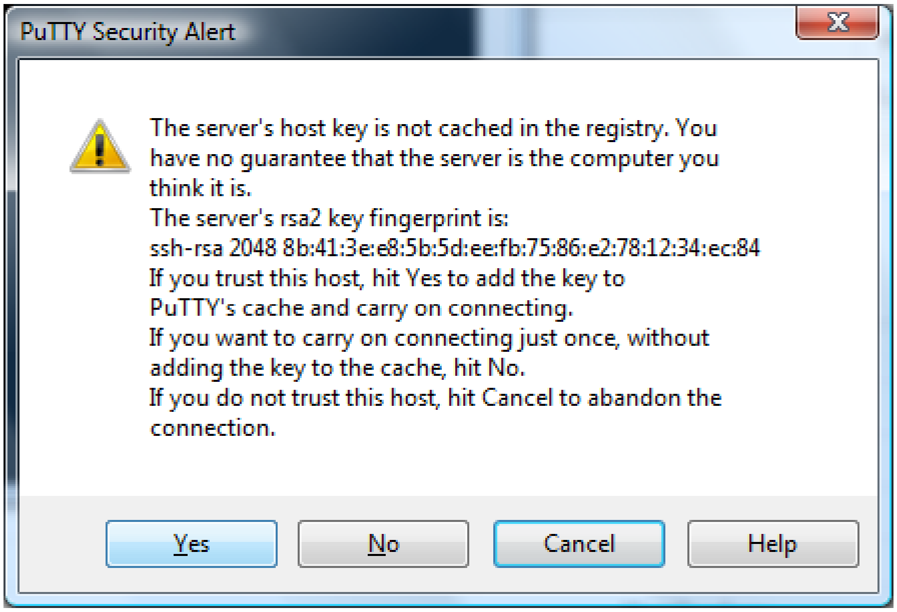
Load, save or delete a stored session

Saved Sessions

Default Settings
Lab
linux
lorienwood.org
stephenmorad

Close window on exit: ○ Always ○ Never ● Only on clean exit

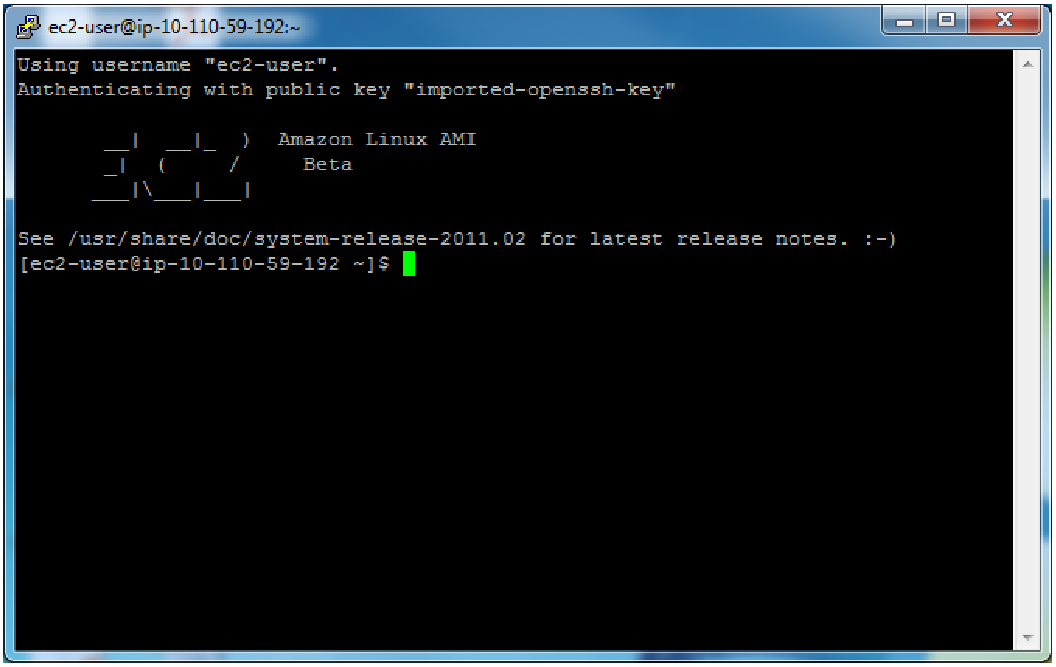
Click “Yes” to confirm that the fingerprint is OK.



The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is.
The server's rsa2 key fingerprint is:
ssh-rsa 2048 8b:41:3e:e8:5b:5d:ee:fb:75:86:e2:78:12:34:ec:84
If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting.
If you want to carry on connecting just once, without adding the key to the cache, hit No.
If you do not trust this host, hit Cancel to abandon the connection.

Security Tip: The SSH fingerprint will eventually show up in the System Log and you can take that and compare it to protect against a Man in the middle attack.

You used the username “ec2-user”. The file Lab.ppk contains your password, so there is no need to enter one.



```
Using username "ec2-user".
Authenticating with public key "imported-openssh-key"

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

See /usr/share/doc/system-release-2011.02 for latest release notes. :-)
[ec2-user@ip-10-110-59-192 ~]$ 
```

Mac OS X or Linux (OpenSSH)

By default, both Mac OS X and Linux operating systems ship with an OpenSSH client that you can use to connect to your EC2 Linux instances. To use the SSH client with the key you created, a few steps are required.

1. Ideally, put the private key you downloaded while launching your EC2 instance (Lab.pem) into the .ssh directory in your home directory. For example:

   ```
   Prompt> mv Lab.pem ~/.ssh
   ```

2. Make sure your private key is only readable and writable by you (this assumes your private key was copied into your .ssh directory as described above):

   ```
   Prompt> chmod 600 ~/.ssh/Lab.pem
   ```

3. Use your private key when connecting to the instance. The format of the ssh client is as follows:
   ssh -i <private_key> <user name>@<host name>

   Therefore connecting to your Amazon Linux instance will require a command similar to the following:

   ```
   Prompt> ssh -i Lab.pem ec2-user@<EC2 Host Name or EIP>
   ```