

Amazon AWS Tutorial II: Windows and Linux on EC2

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Amazon EC2 Getting Started

- Official Website: <http://aws.amazon.com/ec2>
- Sign up (credit card information required).
- Launch Instance
 - <http://aws.amazon.com/console/>
 - Username: compmed@cs.unm.edu
 - Password:

Overview

- Understanding AMI (Amazon Machine Image)
- Launching, using and shutting down a Windows instance.
- Launching, using and shutting down a Linux instance.

What is an AMI

- A computer cannot run without first loading software but must be running before any software can be loaded, which seems as impossible as to "pull yourself up by your own bootstraps."

IBM PC Bootstrapping

- Upon starting, an x86 CPU runs the instruction located at the memory location CS:IP F000:FFF0 of the BIOS, which is located at the 0xFFFF0 linear address.
- This memory location typically contains a jump instruction that transfers execution to the location of the BIOS start-up program.

IBM PC Bootstrapping (cont.)

- The BIOS program runs a power-on self test (POST) to check and initialize required devices and then goes through a list of non-volatile storage devices until it finds one that is bootable.
- A bootable device is defined as one that can be read from, and the last two bytes of the first sector contain the word 0xAA55 (also known as the boot signature).

IBM PC Bootstrapping (cont.)

- Once the BIOS has found a bootable device it loads the boot sector to hexadecimal Segment: Offset address 0000:7C00 or 07C0:0000 (maps to the same ultimate address) and transfers execution to the boot code.

System Image

- A system image is a copy of the entire state of a computer system.
- A system is said to be capable of using system images if it can be shut down and later restored to exactly the same state.
- E.g., hibernation

Virtualization

- Hardware virtualization or platform virtualization is the creation of a virtual machine that acts like a real computer with an operating system.
- Software executed on these virtual machines is separated from the underlying hardware resources.
- For example: Virtual PC, Vmware, VirtualBox.

Amazon Machine Image

- A special type of virtual machine.
- The main component of an AMI is a read-only file system image which includes an operating system (e.g., Linux, UNIX, or Windows) and any additional software required to deliver a service or a portion of it.

Thus ...

- In order to use Amazon EC2, one needs to:
 - Select the virtual hardware.
 - Pick an AMI to run on the virtual hardware.
 - Associate security credentials in order to log in to the virtual machine.

Overview

- Understanding AMI (Amazon Machine Image)
- Launching, using, and shutting down a Windows instance.
- Launching, using, and shutting down a Linux instance.

Region Selection

- Amazon has four regions. Each region should be viewed as total separated from each other, i.e., with different images, key pairs, and so on.

The screenshot displays the Amazon EC2 Console Dashboard. At the top, there is a navigation bar with various AWS services: Elastic Beanstalk, Amazon S3, Amazon EC2 (highlighted), Amazon VPC, Amazon CloudWatch, Amazon Elastic MapReduce, Amazon CloudFront, Amazon RDS, and Amazon SNS. Below this, the 'Navigation' sidebar on the left lists various EC2-related categories: EC2 Dashboard, INSTANCES (with sub-items for Instance Profiles, Spot Requests, AMIs, Bundle Tasks, Volumes, and Snapshots), ELASTIC BLOCK STORE, and NETWORKING & SECURITY (with sub-items for Elastic IPs, Security Groups, Placement Groups, Load Balancers, and Key Pairs). The main content area is titled 'Getting Started' and features a 'Launch Instance' button. A yellow banner below the button states: 'Note: Your instances will launch in the US East (Virginia) region.' Below this is a 'Service Health' section with a table showing the current status of Amazon EC2 in the US East - N. Virginia region as 'Service is operating normally'. On the right side, the 'My Resources' section shows a summary of resources in the US East (Virginia) region: 0 Running Instances, 0 Elastic IPs, 0 EBS Volumes, 0 EBS Snapshots, 4 Key Pairs, 6 Security Groups, 0 Load Balancers, and 0 Placement Groups. A 'Refresh' button is present next to the resource counts. At the bottom right, there is a 'Related Links' section with links to Documentation, All EC2 Resources, Forums, Feedback, and Report an Issue.

Current Status	Details
Amazon EC2 (US East - N. Virginia)	Service is operating normally View complete service health details

My Resources	
You are using the following Amazon EC2 resources in the US East (Virginia) region: Refresh	
0 Running Instances	0 Elastic IPs
0 EBS Volumes	0 EBS Snapshots
4 Key Pairs	6 Security Groups
0 Load Balancers	0 Placement Groups

Related Links

- > Documentation
- > All EC2 Resources
- > Forums
- > Feedback
- > Report an Issue

Launch a Windows Instance

The screenshot displays the AWS Management Console interface for the Amazon EC2 service. At the top, the navigation bar includes the AWS logo, the URL 'aws.amazon.com', and various links like 'Products', 'Developers', 'Community', 'Support', and 'Account'. On the right, it shows a user greeting 'Welcome, Shuang Luan' and links for 'Settings' and 'Sign Out'.

The main content area is titled 'Amazon EC2 Console Dashboard'. It features a left-hand navigation pane with categories like 'Region' (set to US East (Virginia)), 'INSTANCES', 'IMAGES', 'ELASTIC BLOCK STORE', and 'NETWORKING & SECURITY'. The 'INSTANCES' section is expanded, showing options for 'Instances', 'Spot Requests', and 'Reserved Instances'.

The central 'Getting Started' section contains a yellow box with the text: 'To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.' Below this text is a prominent 'Launch Instance' button with a play icon. A large red arrow points directly to this button. A note below the button states: 'Note: Your instances will launch in the US East (Virginia) region.'

To the right of the 'Getting Started' section is the 'My Resources' section, which lists various EC2 resources in the US East (Virginia) region: 0 Running Instances, 0 Elastic IPs, 0 EBS Volumes, 0 EBS Snapshots, 0 Key Pairs, 1 Security Group, 0 Load Balancers, and 0 Placement Groups. A 'Refresh' button is located next to the resource list.

At the bottom of the dashboard is the 'Service Health' section, which shows the 'Current Status' of Amazon EC2 (US East - N. Virginia) as 'Service is operating normally'. A link is provided to 'View complete service health details'.

Finally, the 'Related Links' section at the bottom right offers links to 'Documentation', 'All EC2 Resources', 'Forums', 'Feedback', and 'Report an Issue'.

Choose an AMI

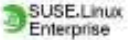





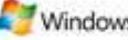

Request Instances Wizard Cancel


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

Root Device Size: 15 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	Select 
	Microsoft Windows Server 2008 Base (AMI Id: ami-c3e40daa) Microsoft Windows 2008 R1 SP2 Datacenter edition and 32-bit architecture. Root Device Size: 30 GB	Select 
	Microsoft Windows Server 2008 R2 Base (AMI Id: ami-ee926087) Microsoft Windows 2008 R2 Datacenter edition and 64-bit architecture. Root Device Size: 35 GB	Select 
	Microsoft Windows Server 2008 R2 with SQL Server Express and IIS (AMI Id: ami-e0916389) Microsoft Windows Server 2008 R2 Datacenter edition, 64-bit architecture, Microsoft SQLServer 2008 Express, Internet Information Services 7, ASP.NET 3.5. Root Device Size: 35 GB	Select 
	Microsoft Windows Server 2008 R2 with SQL Server Standard (AMI Id: ...)	

 Free tier eligible if used with a micro instance. See [AWS free tier](#) for complete details and terms.

Launch Instance

Request Instances Wizard Cancel X

CHOOSE AN AMI **INSTANCE DETAILS** CREATE A 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: **Availability Zone:** **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.

Request Spot Instances

Launch Instances Into Your Virtual Private Cloud

[Back](#)

Advanced Instance Options

Request Instances Wizard Cancel

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

Number of Instances: 1
Availability Zone: us-east-1a

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: **RAM Disk ID:**


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

User Data:

 base64 encoded

Termination Protection: Prevention against accidental termination.

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

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Tags

Request Instances Wizard

Cancel 



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
<input type="text" value="Name"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	

[Add another Tag.](#) (Maximum of 10)

[< Back](#)

Continue 

EC2 Tag

- Each EC2 tag consists of a key and a value, both of which user defines.
- Tag keys and values are case sensitive.
- Prefix AWS is reserved.
- AWS doesn't apply any semantic meaning to your tags; they're interpreted strictly as strings of characters. AWS doesn't automatically set any tags on resources.

Key Pair for Accessing the Instance

Request Instances Wizard Cancel

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

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

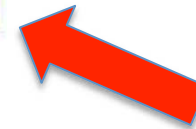
Create a new Key Pair

1. Enter a name for your key pair:* (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.

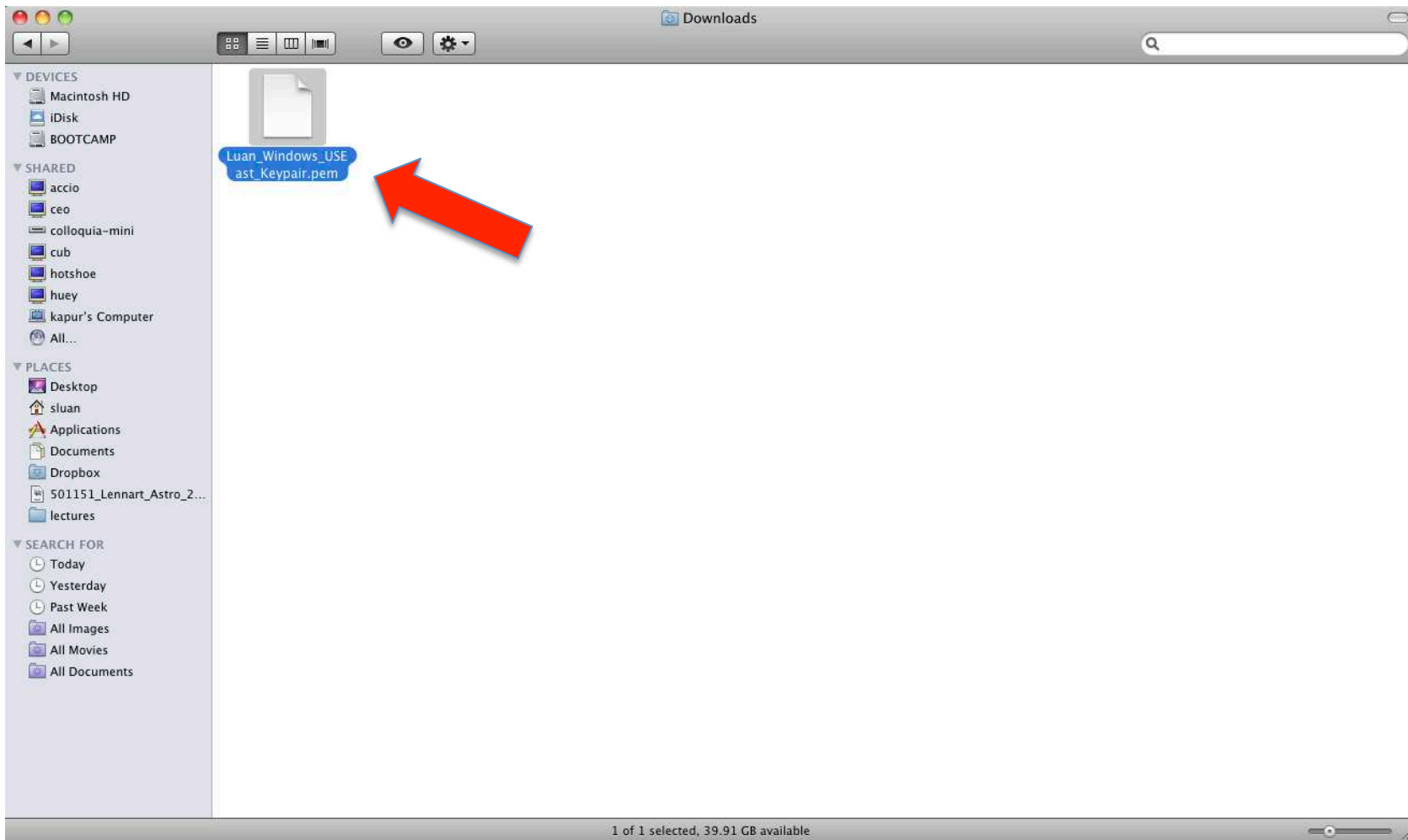


Proceed without a Key Pair

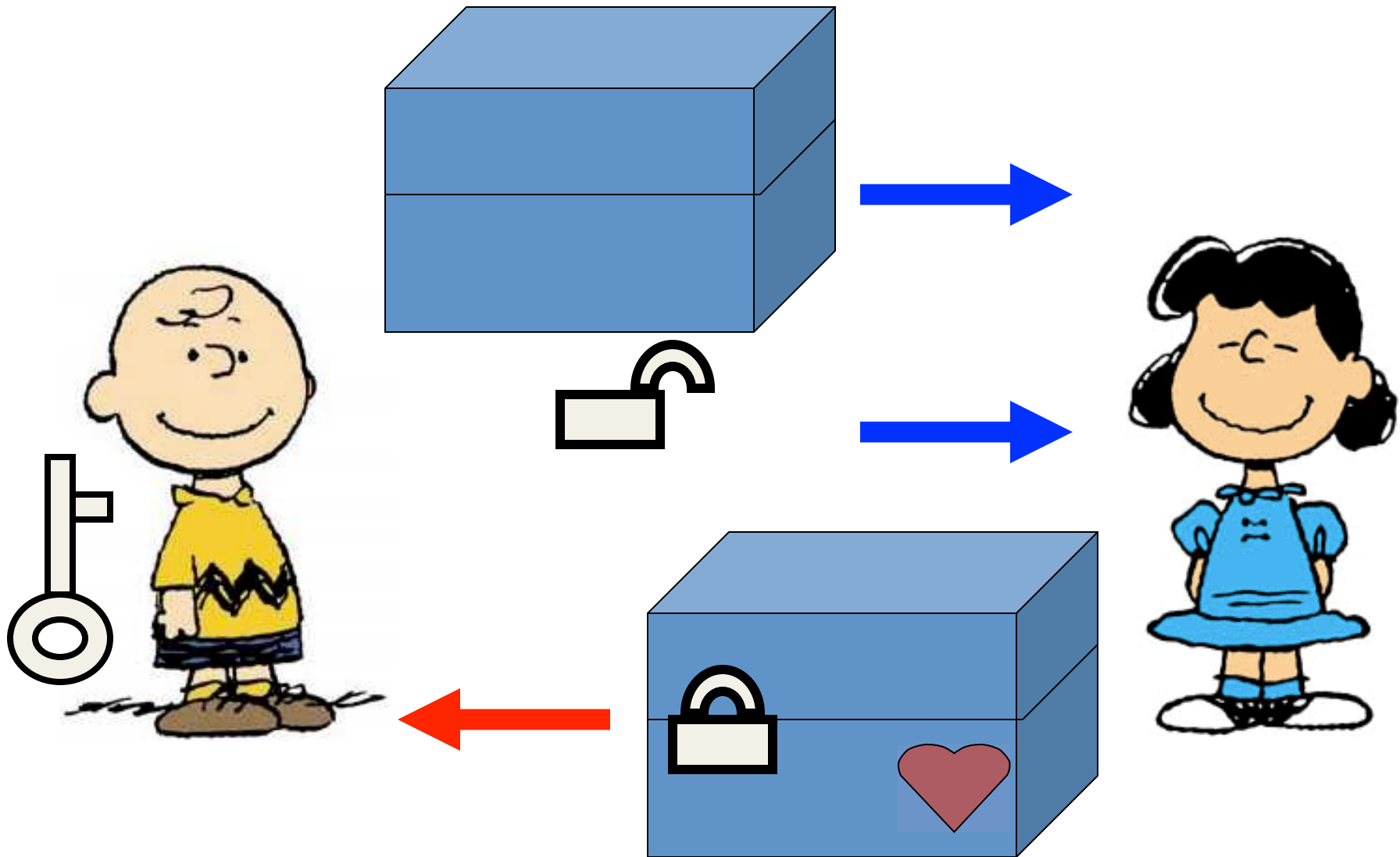
[Back](#)

Continue 

Key Pair File



Public Key System



Key Idea

The key for public system is to construct a one – way encryption function f which is easy to encrypt but hard to decrypt.

For example, the lock box with a lock open is a one - way function. It is easy to put the letter in the box and lock it (i.e., encrypt), but is hard to open the box once it is locked (decrypt).

RSA Public Key System

- Developed by Ron Rivest, Adi Shamir, Len Adleman in 1977, who later shared the 2002 Turing Award.
- The idea of RSA system is based on number theory in particular the factorization of large numbers.

Number Theory behind RSA

Let p and q be distinct primes and k is any integer.

Then :

(a) For any integer a with $GCD(a, pq) = 1$,

$$a^{k(p-1)(q-1)} \bmod pq = 1$$

(b) For any integer a , $a^{k(p-1)(q-1)+1} \bmod pq = a$.

Example

$$p = 5, q = 7, a = 19$$

$$\text{GCD}(a, pq) = 1$$

$$k = 3, a^{k(p-1)(q-1)} = 19^{3 \times 4 \times 6} = 19^{72}$$

$$= 1.1755991641121183246595167229728 \times 10^{92}$$

$$a^{k(p-1)(q-1)} \bmod pq = 1$$

$$a^{k(p-1)(q-1)+1} = 19^{3 \times 4 \times 6 + 1} = 19^{73}$$

$$= 2.2336384118130248168530817736483 \times 10^{93}$$

$$a^{k(p-1)(q-1)+1} \bmod pq = 19.$$

How to use the theorem?

- Suppose we have two primes p and q .
 - $m = pq$
 - $n = (p - 1)(q - 1)$
 - s : $\text{GCD}(s, n) = 1$
- Announce m and s .
- Encoding
 - Someone wants to send me a message a .
 - Encryption rule: send me $b = a^s \pmod m$
- Decoding:
 - $\text{GCD}(s, n) = 1$, then $ts + kn = 1$
 - $b^t \pmod m = (a^s)^t \pmod m = a^{ts+kn} \pmod m = a$

Security Rules

Request Instances Wizard

Cancel

CHOOSE AN AMI

INSTANCE DETAILS

CREATE KEY PAIR

CONFIGURE FIREWALL

REVIEW

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 additional 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

Luan_Windows_Test

Group Description

Windows US East

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
	3389 (RDP)	0.0.0.0/0	Delete
	0 - 65535	0.0.0.0/0	Delete
	80 (HTTP)	0.0.0.0/0	Delete
	443 (HTTPS)	0.0.0.0/0	Delete
	110 (POP3)	0.0.0.0/0	Delete


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Summary

Request Instances Wizard Cancel

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

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


AMI:  Windows AMI ID ami-c3e40daa (i386)
Name: Microsoft Windows Server 2008 Base
Description: Microsoft Windows 2008 R1 SP2 Datacenter edition and 32-bit architecture. [Edit AMI](#)

Number of Instances: 1
Availability Zone: us-east-1a
Instance Type: Small (m1.small)
Instance Class: On Demand [Edit Instance Details](#)

Monitoring: Disabled	Termination Protection: Disabled
Tenancy: Default	
Kernel ID: Use Default	Shutdown Behavior: Terminate
RAM Disk ID: Use Default	
User Data:	Edit Advanced Details

Key Pair Name: Luan_Windows_USEast_Keypair [Edit Key Pair](#)

Security Group(s): sg-78afd911 [Edit Firewall](#)

[< Back](#) [Launch](#) 

Launched

Launch Instance Wizard

Cancel 

 **Your instances are now launching.**

Note: Your instances may take a few minutes to launch, depending on the software you are running.

[View your instances on the Instances page](#)

Other AWS Features

Spot Instances

Spot Instances enable customers to lower their Amazon EC2 costs by up to 75% by bidding on unused capacity and running instances for as long as the maximum bid exceeds the current Spot Price.

[Go to Amazon EC2 Spot Instances](#)

Reserved Instances

Reserved Instances provide substantial savings over On-Demand instances and ensure that the capacity you need is available to you when required.

[Go to Amazon EC2 Reserved Instances](#)

Suse Linux Instances

Suse Linux instances are a proven platform with superior reliability and security and are automatically kept up to date with Novell's security patches, bug fixes and new features.

[Go to Amazon EC2 running SUSE Linux](#)

Close



AWS Console

AWS Elastic Beanstalk S3 EC2 VPC CloudWatch Elastic MapReduce CloudFront CloudFormation RDS SNS IAM

Navigation

Region: US East (Virginia)

- > EC2 Dashboard

INSTANCES

- > Instances
- > Spot Requests
- > Reserved Instances

IMAGES

- > AMIs
- > Bundle Tasks

ELASTIC BLOCK STORE

- > Volumes
- > Snapshots

NETWORKING & SECURITY

- > Security Groups
- > Elastic IPs
- > Placement Groups
- > Load Balancers
- > Key Pairs

My Instances

Launch Instance Instance Actions Show/Hide Refresh Help

Viewing: All Instances All Instance Types 1 to 1 of 1 Instances

Name	Instance	AMI ID	Root Device	Type	Status	Security Groups	Key Pair Name	Monitoring	Virtualization	Placeme	
<input type="checkbox"/>	empty	i-ed54b383	ami-c3e40daa	ebs	m1.small		Luan_Windows_Te	Luan_Windows_USEast_Keypair	basic	hvm	

0 EC2 Instances selected

Select an instance above

Retrieve Windows Password

The screenshot shows the AWS Management Console interface. The top navigation bar includes links for Elastic Beanstalk, S3, EC2, VPC, CloudWatch, Elastic MapReduce, CloudFront, CloudFormation, RDS, SNS, and IAM. The left sidebar contains navigation links for EC2 Dashboard, INSTANCES (Instances, Spot Requests, Reserved Instances), IMAGES (AMIs, Bundle Tasks), ELASTIC BLOCK STORE (Volumes, Snapshots), and NETWORKING & SECURITY (Security Groups, Elastic IPs, Placement Groups, Load Balancers, Key Pairs). The main content area is titled 'My Instances' and shows a table of instances. A single instance is listed with the name 'empty', type 'm1.small', and status 'running'. A dropdown menu is open over the instance, showing 'Instance Management' options. A red arrow points to the 'Get Windows Password' option. Below the table, there is a section for '1 EC2 Instance selected' with details for 'EC2 Instance' including Description, AMI (Windows-Server2), Security Groups, Status, Zone (us-east-1a), Type (m1.small), and Owner.

Name	Instance	AMI ID	Root Device	Type	Status	Security Groups	Key Pair Name	Monitoring	Virtualization	Placeme
empty				m1.small	running	Luan_Windows_Te	Luan_Windows_USEast_Keypair	basic	hvm	

- Instance Management
 - Connect
 - Get System Log
 - Create Image (EBS AMI)
 - Add/Edit Tags
 - Change Security Groups
 - Change Source / Dest Check
 - Bundle Instance (S3 AMI)
 - Get Windows Password
 - Launch More Like This
 - Disassociate IP Address
 - Change Termination Protection
 - View/Change User Data
 - Change Instance Type
 - Change Shutdown Behavior
- Instance Lifecycle
 - Terminate
 - Reboot
 - Stop
 - Start
- CloudWatch Monitoring
 - Enable Detailed Monitoring
 - Disable Detailed Monitoring

Retrieving Password (cont.)

Retrieve Default Windows Administrator Password

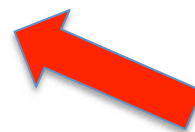
Cancel 



Not available yet.

Password generation and encryption can sometimes take more than 30 minutes. Please wait at least 15 minutes after launching an instance before trying to retrieve the generated password.

Close



After 15 Minutes

Retrieve Default Windows Administrator Password

Cancel 

 **Password decrypted for instance** i-ed54b383



Password change recommended.

We recommend that you change your password to one you will remember and know privately.

Please note that passwords can persist through bundling phases and will not be retrievable through this tool. It is therefore important that you change your password to one that you will remember if you intend to bundle a new AMI from this instance.

You can connect remotely using this information:

Computer: ec2-50-19-12-0.compute-1.amazonaws.com

User: Administrator

**Decrypted
Password:**



Close

Connecting to Windows



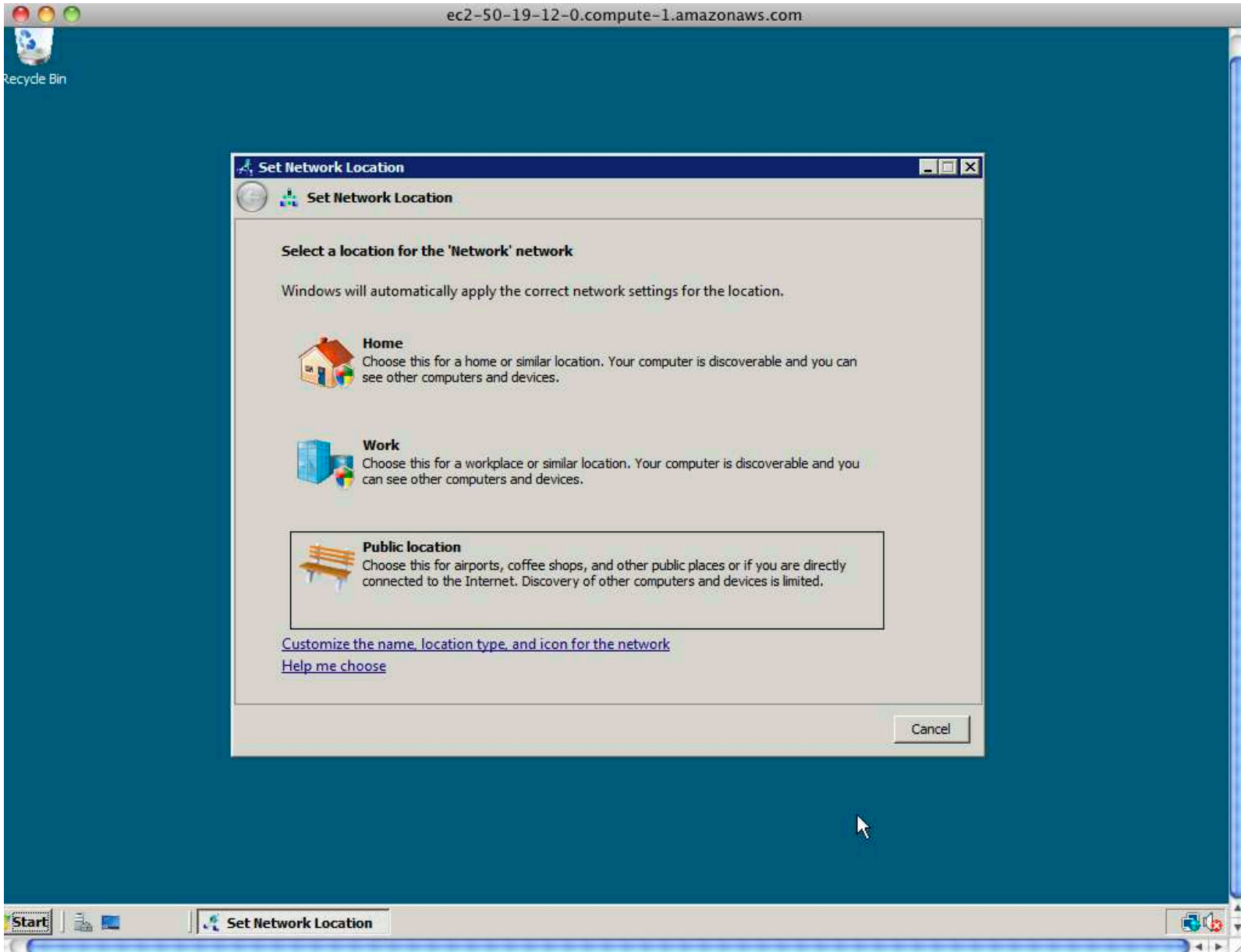
Connecting to Windows (cont.)



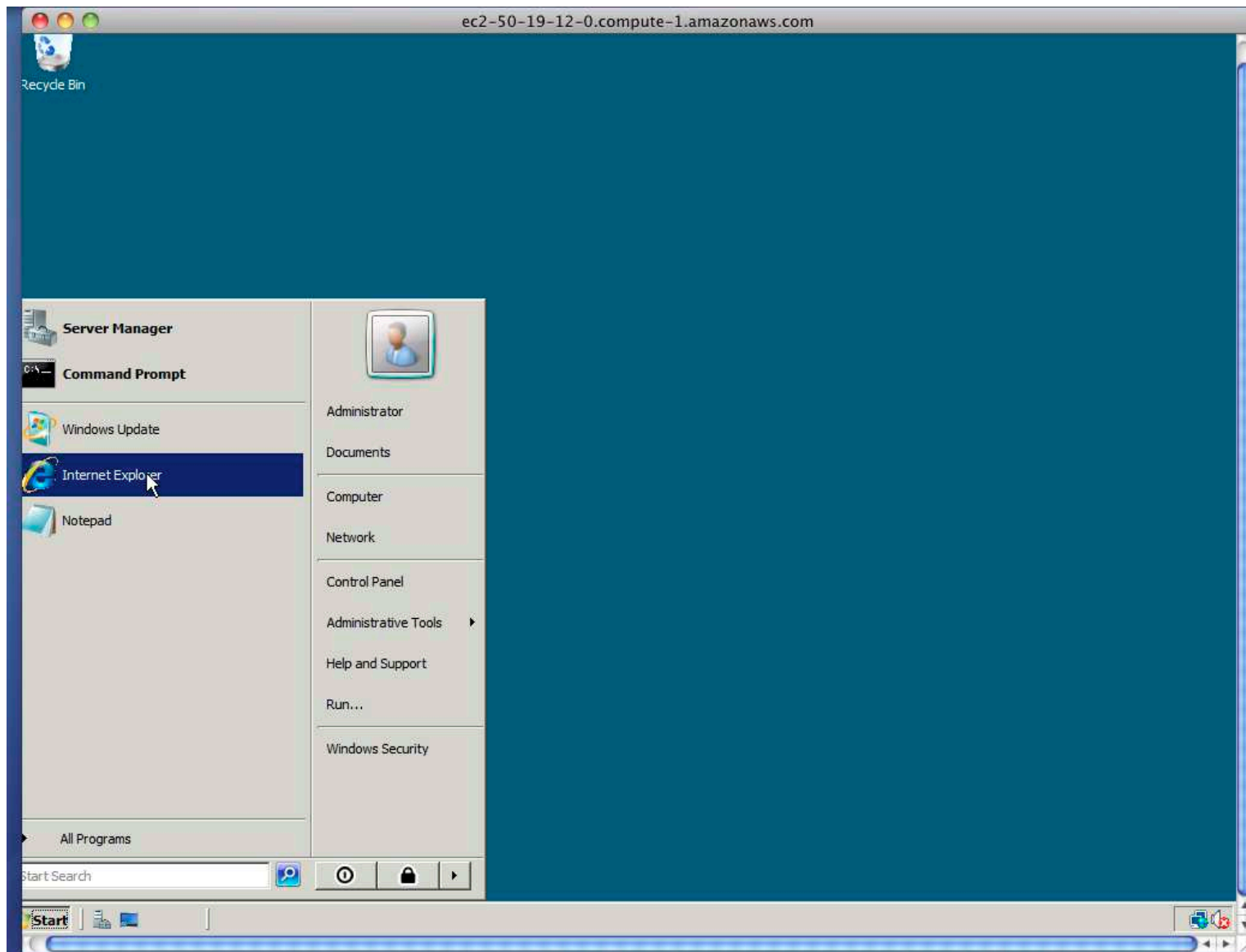
Connecting to Windows (cont.)



Connecting to Windows (cont.)



Using Windows



Using Windows (cont.)

The screenshot shows a Windows Internet Explorer browser window. The address bar contains the URL <http://www.cs.unm.edu/~compmed/workshop2011/>. The page title is "New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning". The page content includes the UNM Particle Therapy Group logo, a greeting "Dear Colleagues," and an invitation to attend the "First New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning" on May 16-18, 2011. A list of topics to be discussed is provided, including treatment planning, Monte Carlo in particle therapy, parallel computing, variance reduction, and Monte Carlo dose calculation engines. The page also mentions the workshop format (short talks and round table discussions), the location (University of New Mexico, Albuquerque), and the registration fee (\$200). A list of speakers is provided, including Michael Hentschel, Shuang (Sean) Luan, Niels Bassler, Roy Keyes, and Anil Prinja. The page footer includes a link to the "Workshop Program" and "Venue and Location" information.

ec2-50-19-12-0.compute-1.amazonaws.com

New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning - Windows Internet Explorer

http://www.cs.unm.edu/~compmed/workshop2011/

New Mexico Workshop on Monte Carlo for Particle Th...

UNM Particle Therapy Group

New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning

UNM

Dear Colleagues,

We invite you to attend the **First New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning**. The workshop will explore technologies that may enable Monte Carlo simulations for routine clinical applications and will cover a wide range of exciting topics in the context of particle therapy, including:

- Treatment planning and verification for particle therapies
- The role of Monte Carlo in particle therapy
- Parallel and distributed computing for clinical use
- Variance reduction techniques for clinical Monte Carlo
- Robustness of treatment planning codes
- The current state of various Monte Carlo dose calculation engines
- Potential impact of Monte Carlo for clinical use

A group of internationally renowned scientists will present their latest research results. The workshop will take the format of short talks and round table discussions. The diverse topics will have the primary focus of making Monte Carlo methods usable for routine clinical applications in particle therapy.

The workshop will take place **May 16th - 18th, 2011** (Immediately following PTCOG) at the beautiful campus of the University of New Mexico, Albuquerque, New Mexico, United States. The State of New Mexico has long been referred to as the Land of Enchantment and offers exciting opportunities for outdoor activities. The University of New Mexico campus is nestled at the foothills of the Sandia Mountains. Local attractions include Sandia Peak Tramway, historic Albuquerque Old Town, Santa Fe, Indian Pueblos, beautiful hiking trails, and New Mexico's famous cuisine.

A block of rooms has been reserved at the Hotel Parq Central in Albuquerque at a special rate. A registration fee of \$200 will be charged to cover parts of the conference expenses.

See you in Albuquerque!

Michael Hentschel - MPIK, Germany Shuang (Sean) Luan - UNM (CS)

Niels Bassler - Aarhus University, Denmark Roy Keyes - UNM (Physios)

Anil Prinja - UNM (Nuclear Engineering)

[Workshop Program](#) - 16 - 18 May 2011

[Workshop schedule \(PDF\)](#) Updated 11 May 2011

[Venue and Location](#) - University of New Mexico, Albuquerque, New Mexico, USA

The workshop will take place in UNM's new Centennial Engineering Center, near the intersection of University Blvd. and Central Ave. The Centennial Engineering Center (CEC) is #117 (north, L16) on the campus map (PDF) & Albuquerque map.

Done

Internet | Protected Mode: Off

50%

Start | New Mexico Worksho...

Terminate Windows Instance

The screenshot displays the AWS Management Console interface. At the top, there is a navigation bar with various AWS services. The main content area is titled 'My Instances' and shows a table of instances. A context menu is open over the first instance, with 'Terminate' highlighted. The instance details are visible on the right side of the console.

Navigation: Region: US East (Virginia)

My Instances: Launch Instance Instance Actions Show/Hide Refresh Help

Viewing: All Instances All Instance Types 1 to 1 of 1 Instances

Name	Instance	AMI ID	Root Device	Type	Status	Security Groups	Key Pair Name	Monitoring	Virtualization	Placeme
<input checked="" type="checkbox"/>	empty	i-ed54b383	ami-c3e40daa	ebs	m1.small	running	Luan_Windows_Te	Luan_Windows_USEast_Keypair	<input checked="" type="checkbox"/> basic	hvm

Instance Management:

- Connect
- Get System Log
- Create Image (EBS AMI)
- Add/Edit Tags
- Change Security Groups
- Change Source / Dest Check
- Bundle Instance (S3 AMI)
- Get Windows Password
- Launch More Like This
- Disassociate IP Address
- Change Termination Protection
- View/Change User Data
- Change Instance Type
- Change Shutdown Behavior

Instance Lifecycle:

- Terminate
- Reboot
- Stop
- Start

CloudWatch Monitoring:

- Enable Detailed Monitoring

Instance Details:

- RAM Disk ID: -
- Key Pair Name: Luan_Window
- Monitoring: basic
- Elastic IP: -
- Root Device Type: ebs
- Lifecycle: normal
- Block Devices: sda1
- Public DNS: ec2-50-19-12
- Private DNS: ip-10-86-215
- Private IP Address: 10.86.215.12
- Launch Time: 2011-05-12 0
- State Transition Reason:

Platform: windows

Kernel ID: -

AMI Launch Index: 0

Root Device: sda1

Tenancy: default

Instance Terminated

aws.amazon.com | AWS | Products | Developers | Community | Support | Account | Welcome, Shuang Luan | Settings | Sign Out

AWS Elastic Beanstalk S3 EC2 VPC CloudWatch Elastic MapReduce CloudFront CloudFormation RDS SNS IAM

Navigation
Region: US East (Virginia)
EC2 Dashboard
INSTANCES
Instances
Spot Requests
Reserved Instances
IMAGES
AMIs
Bundle Tasks
ELASTIC BLOCK STORE
Volumes
Snapshots
NETWORKING & SECURITY
Security Groups
Elastic IPs
Placement Groups
Load Balancers
Key Pairs

My Instances
Launch Instance Instance Actions Show/Hide Refresh Help
Viewing: All Instances All Instance Types 1 to 1 of 1 Instances


Name	Instance	AMI ID	Root Device	Type	Status	Security Groups	Key Pair Name	Monitoring	Virtualization	Placeme
<input type="checkbox"/>	empty	i-ed54b383	ami-c3e40daa	ebs	m1.small	terminated	Luan_Windows_Te	Luan_Windows_USEast_Keypair	basic	hvm

1 EC2 Instance selected

EC2 Instance: i-ed54b383

Description Monitoring Tags

AMI:	Windows-Server2008-i386-Base-v103 (ami-c3e40daa)	Zone:	us-east-1a
Security Groups:	Luan_Windows_Test	Type:	m1.small
Status:	shutting-down	Owner:	994860338133
VPC ID:	-	Subnet ID:	-
Source/Dest. Check:	-	Virtualization:	hvm
Placement Group:	-	Reservation:	r-3553ff59
RAM Disk ID:	-	Platform:	windows
Key Pair Name:	Luan_Windows_USEast_Keypair	Kernel ID:	-



Overview

- Understanding AMI (Amazon Machine Image)
- Launching, using and shutting down a Windows instance.
- Launching, using and shutting down a Linux instance.

EC2 Tab in the Management Console

The screenshot shows the Amazon EC2 Console Dashboard. At the top, there is a navigation bar with the AWS logo, the URL 'aws.amazon.com', and links for 'AWS | Products | Developers | Community | Support | Account'. On the right side of the navigation bar, it says 'Welcome, Computational Medicine | Settings | Sign Out'. Below the navigation bar, there is a row of service tabs: 'Elastic Beanstalk', 'S3', 'EC2', 'VPC', 'CloudWatch', 'Elastic MapReduce', 'CloudFront', 'RDS', and 'SNS'. The 'EC2' tab is highlighted. On the left side, there is a 'Navigation' sidebar with a 'Region' dropdown set to 'US East'. The sidebar contains several categories: 'INSTANCES' (with sub-items 'Instances' and 'Spot Requests'), 'IMAGES' (with sub-items 'AMIs' and 'Bundle Tasks'), 'ELASTIC BLOCK STORE' (with sub-items 'Volumes' and 'Snapshots'), and 'NETWORKING & SECURITY' (with sub-items 'Elastic IPs', 'Security Groups', 'Placement Groups', 'Load Balancers', and 'Key Pairs'). The main content area is titled 'Amazon EC2 Console Dashboard' and is divided into three sections: 'Getting Started', 'Service Health', and 'My Resources'. The 'Getting Started' section has a yellow background and contains the text: 'To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.' Below this text is a 'Launch Instance' button with a downward arrow. A large green arrow with a red outline points to this button. Below the 'Launch Instance' button is a note: 'Note: Your instances will launch in the US East (Virginia) region.' The 'Service Health' section shows a table with two columns: 'Current Status' and 'Details'. The first row shows a green checkmark in the 'Current Status' column and 'Amazon EC2 (US East - N. Virginia)' in the 'Details' column. The 'My Resources' section shows a list of resources: '0 Running Instances', '0 Elastic IPs', '0 EBS Volumes', '0 EBS Snapshots', '4 Key Pairs', '6 Security Groups', '0 Load Balancers', and '0 Placement Groups'. There is a 'Refresh' button next to the resource list. At the bottom, there is a 'Related Links' section with links to 'Documentation', 'All EC2 Resources', 'Forums', 'Feedback', and 'Report an Issue'.





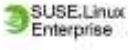

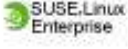



Request Instance

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

	Basic 32-bit Amazon Linux AMI 2010.11.1 Beta (AMI Id: ami-76f0061f) Amazon Linux AMI Base 2010.11.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GiB	Select 
	Basic 64-bit Amazon Linux AMI 2010.11.1 Beta (AMI Id: ami-74f0061d) Amazon Linux AMI Base 2010.11.1, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GiB	Select 
	SUSE Linux Enterprise Server 11 32-bit (AMI Id: ami-e0a35789) SUSE Linux Enterprise Server 11 Service Pack 1 basic install, EBS boot, 32-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 GiB	Select 
	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 GiB	Select 
	Getting Started on Microsoft Windows Server 2008 (AMI Id: ami-c5e40dac) Microsoft Windows Server 2008 R1 SP2 Datacenter edition, 32-bit architecture, Microsoft SQLServer 2008 Express, Internet Information Services 7, ASP.NET 3.5. Root Device Size: 30 GiB	Select 

Request Instance (cont.)

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: **Availability Zone:**

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.

Request Spot Instances

Launch Instances Into Your Virtual Private Cloud

[< Back](#)

Request Instance (cont.)

Request Instances Wizard Cancel X

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: **Availability Zone:**

Instance Type:

Type	CPU Units	CPU Cores	Memory
Micro (t1.micro)	Up to 2 ECUs	1 Core	613 MB
Small (m1.small)	1 ECU	1 Core	1.7 GB
High-CPU Medium (c1.medium)	5 ECUs	2 Cores	1.7 GB

Launch Instances
EC2 Instances let you p...
commonly large fixed c...
 Request Spot Inst
 Launch Instances Into Your Virtual Private Cloud

are

Request Instance (cont.)

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: **Availability Zone:**
us-east-1a
us-east-1b
us-east-1c
us-east-1d

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.

Request Spot Instances

Launch Instances Into Your Virtual Private Cloud

Request Instance (cont.)

Request Instances Wizard Cancel

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

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:

RAM Disk ID:

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

User Data:

base64 encoded

Request Instance (cont.)

Request Instances Wizard Cancel

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


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
<input type="text" value="Name"/>	<input type="text"/>	<input type="button" value="X"/>
<input type="text"/>	<input type="text"/>	<input type="button" value="X"/>

[Add another Tag.](#) (Maximum of 10)

Request Instance (cont.)

Request Instances Wizard

Cancel 

 CHOOSE AN AMI

 INSTANCE DETAILS

 CREATE KEY PAIR

CONFIGURE FIREWALL

REVIEW

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

Your existing Key Pairs*:

- compmedkey
- compmedroy
- sluan_linux_key
- sluan_windows_key

Create a new Key Pair

Proceed without a Key Pair

[< Back](#)

[Continue !\[\]\(248b91fcdac4810ffd15cf33fb6aec6f_img.jpg\)](#)

Key Pair

- A key pair is a security credential similar to a password, which you use to securely connect to your instance once it's running.

Request Instance (cont.)

Request Instances Wizard

Cancel

CHOOSE AN AMI

INSTANCE DETAILS

CREATE KEY PAIR

CONFIGURE FIREWALL

REVIEW

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:* (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

Secure Shell (SSH)

- Designed to replace Telnet, which send information, notably passwords, in plaintext.
- Intended to provide confidentiality and integrity of data over an unsecured network such as the Internet.
- Uses public-key cryptography to authenticate the remote computer and the user.

SSH Preparation: Client

- As a user, you generate an “identity” on the client system by running the ssh-keygen.
- This program creates a subdirectory `$HOME/.ssh` and inserts in it two files named `identity` and `identity.pub` which contain your private and public keys for your account on the client system.
- This latter file can then be appended to a file `$HOME/.ssh/authorized_keys` that should reside on any/all servers where you will make ssh connections.

SSH Preparation: Server

- As a system administrator, you generate a public and private key pair for the system itself.
- If someone wants to fake the server, they will have to break into the system and steal its private key.
- The biggest task is collecting and distributing the keys that identify all the hosts which run ssh.

SSH Authentication

- A user attempts to SSH into the server.
- The server sends its PUBLIC KEY to the user.
- The user checks to see if the PUBLIC KEY exists already in its system. If not, the user is warned. Once the user accepts the key, it is added to the trusted list.
- The user uses the server's PUBLIC KEY to encrypt all communications to the server.
- At the initial stage, this would include user name, password.

SSH Authentication (cont.)

- The user also sends its PUBLIC KEY to the server. (NOT the same as the Server's PUBLIC KEY).
- The server uses its own PRIVATE KEY to decrypt all communications from the user (encrypted using the server's PUBLIC KEY). The server then uses the user's PUBLIC KEY to encrypt all communications to the user.
- The user uses its PRIVATE KEY to decrypt all communications sent by the server (encrypted using the user's PUBLIC KEY).

No Password Authentication


- Client attempts to connect to the server.
- Server checks to see if `.rhosts` or `/etc/hosts.equiv` exist (or `.shosts` and `/etc/shosts.equiv`)
- Server checks to see if client's host public key is known (i.e. if it exists in `/etc/ssh_known_hosts` or `~/.ssh/ssh_known_hosts`)
- If found server uses the client's public key and generates an encrypted challenge to the client.
- Client decrypts challenge using its host private key and responds.
- Session is authenticated without use of a password.

Key Pairs from EC2

- I think the key pair we downloaded from EC2 contains the public and private key used by the client.
- This is why “Amazon does not store the private key for security reasons. This is most easily retrieved from one of the other Compmed staff. If the private key is lost or stolen, then a new public and private certificate should be generated as soon as possible”.

Request Instance (cont.)

Request Instances Wizard

Cancel 



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

Your existing Key Pairs*:

- compmedkey
- compmedroy
- sluan_linux_key
- sluan_windows_key

Create a new Key Pair

Proceed without a Key Pair

< Back

Continue 

Request Instance (cont.)

Request Instances Wizard Cancel X

CHOOSE AN AMI INSTANCE DETAILS CREATE KEY PAIR CONFIGURE FIREWALL REVIEW

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

AMI:  Amazon Linux AMI ID ami-76f0061f (i386)
Name: Basic 32-bit Amazon Linux AMI 2010.11.1 Beta
Description: Amazon Linux AMI Base 2010.11.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools. [Edit AMI](#)

Number of Instances: 1
Availability Zone: No Preference
Instance Type: Small (m1.small)
Instance Class: On Demand [Edit Instance Details](#)

Monitoring: Disabled
Kernel ID: Use Default
RAM Disk ID: Use Default
User Data: [Edit Advanced Details](#)

Key Pair Name: Luan_G4_keypair [Edit Key Pair](#)

Security Group(s): sluan_ssh_http [Edit Firewall](#)

[Back](#) [Launch](#) 

Request Instance (cont.)

Launch Instance Wizard

Cancel 

 **Your instances are now launching.**

Note: Your instances may take a few minutes to launch, depending on the software you are running.

> [View your instances on the Instances page](#)

Other AWS Features

Relational Database Service

Amazon RDS makes it easy to set up, operate, and scale a relational database deployment. Launch a pre-configured, resizable MySQL deployment in minutes and let Amazon manage automated backups, patching, and high availability replication.

> [Go to Amazon RDS](#)

Volumes

EBS Volumes provide off-instance storage that persists independently of the life of an instance. Add a persistent storage device to an instance using the Elastic Block Store (EBS) Volumes page.

> [Go to EBS Volumes](#)

Elastic IPs

Elastic IP addresses allow you to remap a public IP address to any instance in your account. Elastic IPs also enable you to engineer around problems by quickly remapping your Elastic IP address to a replacement instance.

> [Go to Elastic IPs](#)

Close 

Instances

The screenshot displays the AWS Management Console interface for EC2 instances. The top navigation bar includes services like Elastic Beanstalk, S3, EC2, VPC, CloudWatch, Elastic MapReduce, CloudFront, RDS, and SNS. The left-hand navigation pane is expanded to show 'Instances' under the 'INSTANCES' section. The main content area shows a table with one instance, 'i-36fe8272', in a 'running' state. Below the table, the instance details are displayed in a key-value format. A red arrow points to the 'Public DNS' field, which has the value 'ec2-50-18-14-190.us-west-1.compute.amazonaws.com'.

Name	Instance	AMI ID	Root Device	Type	Status	Security Groups	Key Pair Name	Monitoring	Virtualization	Placement Group
<input checked="" type="checkbox"/>	i-36fe8272	ami-655a0a20	ebs	m1.small	running	Luan_SSH_HTTP	Luan_West_MC_keypair	basic	paravirtual	

AMI ID: ami-655a0a20
Security Groups: Luan_SSH_HTTP
Status: running
VPC ID: -
Virtualization: paravirtual
Reservation: r-dae0879e
Platform: -
Kernel ID: aki-99a0f1dc
AMI Launch Index: 0
Root Device: /dev/sda1
Block Devices: /dev/sda1=vol-8b4c49e1:attached:2011-02-07T02:18:30.000Z:true
Lifecycle: normal
Public DNS: ec2-50-18-14-190.us-west-1.compute.amazonaws.com
Private DNS: ip-10-170-245-31.us-west-1.compute.internal
Private IP Address: 10.170.245.31
Launch Time: 2011-02-06 19:18 MST
State Transition Reason:

Zone: us-west-1c
Type: m1.small
Owner: [REDACTED]
Subnet ID: -
Placement Group:
RAM Disk ID: -
Key Pair Name: Luan_West_MC_keypair
Monitoring: basic
Elastic IP: -
Root Device Type: ebs

Login to Instance

```
ec2-user@ip-10-170-245-31:~ -- ssh -- 80x24
Shuang-Luans-MacBook-Pro:US_West sluan$ ssh -i Luan_West_MC_keypair.pem root@ec2-50-18-14-190.us-west-1.compute.amazonaws.com
Please login as the ec2-user user rather than root user. ←
Connection to ec2-50-18-14-190.us-west-1.compute.amazonaws.com closed.
Shuang-Luans-MacBook-Pro:US_West sluan$ ssh -i Luan_West_MC_keypair.pem ec2-user@ec2-50-18-14-190.us-west-1.compute.amazonaws.com

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

See /usr/share/doc/amzn-ami/image-release-notes for latest release notes. :-)
[ec2-user@ip-10-170-245-31 ~]$ which gcc ←
/usr/bin/which: no gcc in (/usr/local/bin:/bin:/usr/bin:/opt/aws/bin:/home/ec2-user/bin)
[ec2-user@ip-10-170-245-31 ~]$ which wget ←
/usr/bin/wget
[ec2-user@ip-10-170-245-31 ~]$ which g++ ←
/usr/bin/which: no g++ in (/usr/local/bin:/bin:/usr/bin:/opt/aws/bin:/home/ec2-user/bin)
[ec2-user@ip-10-170-245-31 ~]$ █
```

Installing gcc

```
ec2-user@ip-10-170-245-31:~/usr/bin — ssh — 80x24
[ec2-user@ip-10-170-245-31 bin]$ uname -a
Linux ip-10-170-245-31 2.6.34.7-56.40.amzn1.i686 #1 SMP Fri Oct 22 18:48:33 UTC
2010 i686 i686 i386 GNU/Linux
[ec2-user@ip-10-170-245-31 bin]$ which rpm
/bin/rpm
[ec2-user@ip-10-170-245-31 bin]$ sudo yum install gcc
[ec2-user@ip-10-170-245-31 bin]$
```

Installing g++

```
ec2-user@ip-10-170-246-221:~ -- ssh -- 80x24
[ec2-user@ip-10-170-246-221 ~]$ sudo yum install gcc-c++
Loaded plugins: fastestmirror, security
Loading mirror speeds from cached hostfile
Setting up Install Process
Resolving Dependencies
--> Running transaction check
----> Package gcc-c++.i386 0:4.1.2-48.14.amzn1 set to be updated
--> Processing Dependency: libstdc++-devel = 4.1.2-48.14.amzn1 for package: gcc-
c++-4.1.2-48.14.amzn1.i386
--> Running transaction check
----> Package libstdc++-devel.i386 0:4.1.2-48.14.amzn1 set to be updated
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package                Arch      Version                Repository  Size
=====
Installing:
gcc-c++                 i386     4.1.2-48.14.amzn1     amzn       3.3 M
Installing for dependencies:
libstdc++-devel        i386     4.1.2-48.14.amzn1     amzn       2.8 M

Transaction Summary
```

Thank You.