Cloud Computing: Amazon Web Services

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Fall 2013

Penn State
TOC

- Amazon EC2
- Amazon S3
Popular CC Services

- Amazon Web Services (AWS): IaaS
  ![Amazon Web Services](amazon AWS logo)

- Google App Engine (GAE): PaaS
  ![Google App Engine](Google app engine logo)

- Microsoft Azure Services Platform: PaaS
  ![Microsoft Azure](Microsoft Azure logo)
Elastic Compute Cloud (EC2)

- EC2 is a Amazon’s web service that provides re-sizeable *computing capacity*—literally, server instances in Amazon's data centers—that users use to build and host their software systems.
- Users can get access to the infrastructure resources that EC2 provides by using APIs, or web tools and utilities.
• AMI: a template that contains a software configuration (e.g., operating system, application server, and applications)

• From an AMI, users launch *instances*, which are running copies of the AMI
Amazon Machine Image (AMI)

- Instance Type: A particular hardware archetype based on the amount of memory, computing power, etc.
3 Interfaces to Use EC2

- Command Line Tools (API Tools)
  - Java based command line client that wraps EC2 SOAP APIs
  - I.e., SOAP-style web service program

- Programmatic Interfaces
  - Software development kit for Java/PHP/.NET

- AWS Management Console
  - Web based GUI « We will use this one today
  - I.e., This itself is a SOAP-style web service program
You need to create an account first

Amazon Web Services Sign In

You may sign in using your existing Amazon account or you can create a new user.

My e-mail address is: dongwon@psu.edu

- I am a new user.
- I am a returning user and my password is:

Sign in using our secure server

Forgot your password?

Has your e-mail address changed?
To start using Amazon EC2 you will want to launch a virtual server instance in an Amazon EC2 instance.

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

Launch Instance
<table>
<thead>
<tr>
<th>AMI Name</th>
<th>AMI ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic 32-bit Amazon Linux AMI 2010.11.1 Beta</td>
<td>ami-76f0061f</td>
<td>Amazon Linux AMI Base 2010.11.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GB</td>
</tr>
<tr>
<td>Basic 64-bit Amazon Linux AMI 2010.11.1 Beta</td>
<td>ami-74f0061d</td>
<td>Amazon Linux AMI Base 2010.11.1, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GB</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 32-bit</td>
<td>ami-e0a35789</td>
<td>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 GB</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 64-bit</td>
<td>ami-e4a3578d</td>
<td>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</td>
</tr>
<tr>
<td>Getting Started on Microsoft Windows Server 2008</td>
<td>ami-c5e40dac</td>
<td>Free tier eligible. This AMI will not incur additional costs when used with a free tier instance.</td>
</tr>
</tbody>
</table>
EC2 Demo

Provide the details for your instance(s). You may also decide whether you want to launch your instances.

**Number of Instances:** 1

**Availability Zone:** No Preference

**Instance Type:** Micro (t1.micro, 613 MB)

**Termination Protection:** Prevention against accidental termination.

**Launch Instances**

EC2 Instances let you pay for compute capacity by the hour with no long term commitment, commonly large fixed costs into much smaller variable costs.

**Request Spot Instances**

**Launch Instances Into Your Virtual Private Cloud**
EC2 Demo

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 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:

☐ base64 encoded
EC2 Demo

Request Instances Wizard

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

<table>
<thead>
<tr>
<th>Key (127 characters maximum)</th>
<th>Value (255 characters maximum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>aws-test</td>
</tr>
</tbody>
</table>

Add another Tag. (Maximum of 10)
Save the private key file to your local file system.
Choose HTTP, SSH, and DNS from the “Select” pull-down menu → “Add Rule”
Now, I have a virtual server Running on Amazon’s Cloud Computing environment
Accessing the Instance in AWS

Let’s access the instance using any one of the following methods (depending on your platform):

1. Windows: requires PuTTY & PuTTYgen
   Download the binary “putty.exe” and “puttygen.exe” into local disk from:
   Note that this is simple download, not an installation

2. Unix: use “terminal” program

3. Mac: use “iTerm” program
1. Windows w. PuTTY

- Convert the private key file EC2 generated (e.g., `aws-key.pem`) into PuTTY-compatible format first
- Run PuTTYgen → Load → select `aws-key.pem`
1. Windows w. PuTTY

- PuTTYgen will show info about the key loaded
- Save private key → type new file name (e.g., aws-key.ppk) → Yes
1. Windows w. PuTTY

- Run PuTTY
- Connection → SSH → Auth → Browse: select the PuTTYgen generated file (e.g., aws-key.ppk)
1. Windows w. PuTTY

- Session → enter the public DNS of the instance you generated (e.g., ec2-184-72-76-228.compute-1.amazonaws.com) and Open
1. Windows w. PuTTY

- Type “ec2-user” when prompted “login as:”
- Then, you should see message below, inside of the instance you created
2. Mac/Unix w. Terminal+SSH

- Let’s access the instance
  - Make the downloaded private key file safe
    
    ```bash
    chmod 400 private-key-file
    ```
  - Access via SSH channel using “ec2-user” account
    
    ```bash
    ssh -i private-key-file ec2-user@public-DNS
    ```
Inside of AMI Instance

- Whether you used Windows+PuTTY or Mac/Unix+Terminal, at this point, you are able to access AMI instance.
System Admin Commands

- For sys-admin task, prefix your command with “sudo”
Tool: Yum

- Install s/w that you want to install in your AMI instance using Linux package manager
  - yum: http://yum.baseurl.org/
  - Eg, `sudo yum install package-name`
Start Apache Server

- Configure and start Apache web server

```
$ sudo chkconfig httpd on
$ sudo /etc/init.d/httpd start
```

Amazon Linux AMI Test Page

This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page, it means that the Apache HTTP server installed at this site is working properly.

If you are a member of the general public:
The fact that you are seeing this page indicates that the website you just visited is either experiencing problems, or is undergoing routine maintenance.

If you are the website administrator:
You may now add content to the directory /var/www/html/. Note that until you do so, people visiting your website will see this page, and not your content. To prevent this page from ever being used, follow the
Tool: wget

- Build your own home page at /var/www/html
- Download files over http protocol
  - Eg, sudo wget URL

```
[ec2-user@ip-10-117-58-166 ~]$ cd /var/www/html
[ec2-user@ip-10-117-58-166 ~]$ cd /var/www/html
[ec2-user@ip-10-117-58-166 html]$ sudo wget http://www.personal.psu.edu/dul13/ws/map.html
--2011-02-28 03:58:56-- http://www.personal.psu.edu/dul13/ws/map.html
Resolving www.personal.psu.edu... 146.186.15.14
Connecting to www.personal.psu.edu[146.186.15.14]:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: “map.html”

[ <=>   ] 2,932
2011-02-28 03:58:56 (875 KB/s) - “map.html” saved [2932]
[ec2-user@ip-10-117-58-166 html]$
Eg, Google AJAX Example in AWS

Tool: scp

- Upload your app to AMI using scp
- Eg, scp -i private-key-file source-file
  ec2-user@public-DNS:/path/target-file

My local Linux machine

```
donwlee:Desktop$ touch foo
donwlee:Desktop$ scp -i dongwon-key.pem foo ec2-user@ec2-184-73-136-217.compute-1.amazonaws.com:/home/ec2-user/foo
```

My Amazon AMI Instance

```
[ec2-user@ip-10-117-58-166 ~]$ ls -l
 total 0
-rw-r--r-- 1 ec2-user ec2-user 0 Feb 28 04:45 foo
[ec2-user@ip-10-117-58-166 ~]$
[ec2-user@ip-10-117-58-166 ~]$`
Simple Storage Service: S3

- One can use S3 to store and retrieve any amount of data at any time, from anywhere on the web.
- S3 stores data as objects within buckets.
- An object is comprised of a file and optionally any metadata that describes that file.
- Buckets are the containers for objects.
- For each bucket, users can control access to the bucket (who can create, delete, and list objects in the bucket), view access logs for the bucket and its objects, and choose the geographical region where Amazon S3 will store the bucket and its contents.
S3 Common Usage Scenario

- Backup and Storage—Provide data backup and storage services for others
- Application Hosting—Provide services that deploy, install, and manage web applications
- Media Hosting—Build a redundant, scalable, and highly available infrastructure that hosts video, photo, or music uploads and downloads
- Software Delivery—Host your software applications that customers can download
S3 Demo

To get started using Amazon S3, create a
A bucket is a container for objects stored in Amazon S3. When creating a bucket, you can choose a Region to optimize for latency, minimize costs, or address regulatory requirements. For more information regarding bucket naming conventions, please visit the Amazon S3 documentation.

Bucket Name: dongwon-b1
Region: US Standard

The bucket 'dongwon-b1' is empty
To upload files (up to 1.9 GB each) to Amazon S3, click **Add files**. To upload larger files to Amazon S3, click **Enable large uploads**, which will take a few moments as it downloads a Java™ Applet (requires [Java SE 6 Update 10 or later](https://java.com/en/)). To remove files already selected, click the **X** to the far right of the file name.

- **Use Reduced Redundancy Storage**

**pike.jpg (7.3 KB)**

- **Add files**
- **Remove selected files**
- **Enable large uploads**

Number of files: 1  Total upload size: 7.3 KB
S3 Demo

Bucket: dongwon-b1
Name: pike.jpg
Size: 7.3 KB
Last Modified: Mon Feb 28 05:11:21 GMT-500 2011
Owner: Me
ETag: 2a83792f0a8e451aaa75e9416531d2da

Link: https://s3.amazonaws.com/dongwon-b1/pike.jpg
S3 Demo

The PIKE Group
Tool for S3

- S3Fox Organizer
  - Extension for Firefox web browser
  - [http://www.s3fox.net/](http://www.s3fox.net/)
- Once installed
  - Invoke S3 Organizer
S3Fox Organizer Demo

To get your AWS Access Key ID and Secret Access Key

1. Go to http://aws.amazon.com/
2. Click Account and then click Security Credentials.
   The Security Credentials page displays (you might be prompted to log in).
3. Scroll down to Access Credentials and make sure the Access Keys tab is selected.
   The AWS Access Key ID appears in the Access Key column.
4. To view the Secret Access Key, click Show.
S3Fox Organizer Demo

Local Contents

S3 Contents

File Name | File Size(KB) | Modified Time
--- | --- | ---
todo | 1 | 12/17/2009 08:48 PM
teach | 3 | 05/24/2010 01:11 AM
ideas.txt | 2 | 10/26/2008 11:14 PM
402keypair.pem | 2 | 02/27/2011 12:05 AM
.xAuthority | 2 | 02/14/2011 12:11 AM
.serverauth.987 | 1 | 11/10/2008 09:29 PM
.serverauth.643 | 1 | 12/25/2008 09:29 AM
.serverauth.498 | 1 | 11/22/2009 09:06 AM
.serverauth.3511 | 1 | 09/07/2010 10:00 AM
.serverauth.338 | 1 | 02/21/2009 12:31 AM
.serverauth.334 | 1 | 07/08/2010 09:59 AM
.serverauth.298 | 1 | 03/05/2010 03:06 PM
.serverauth.257 | 1 | 04/23/2010 04:03 PM
.serverauth.286 | 1 | 04/20/2009 05:18 PM
.serverauth.278 | 1 | 04/10/2010 05:05 PM
.serverauth.273 | 1 | 04/21/2009 07:19 PM
.serverauth.277 | 1 | 04/10/2010 10:50 PM

Displaying files in /Users/dlee

File Name | File Size(KB) | Upload Time
--- | --- | ---
yuchenn1 | 0 | 02/28/2011 02:02 PM
steven-b1 | 0 | 02/28/2011 02:01 PM
nicole-b1 | 0 | 02/28/2011 02:01 PM

Regular Transfer

Synchronized Folders Transfer

Log

File Name | From | To | Type | Progress | Status
--- | --- | --- | --- | --- | ---

Clear | Pause | Clear Completed | Retry Failed Tasks

Clearing completed tasks...
References

● Amazon EC2 User Guide

● Amazon S3 User Guide
  ● http://docs.amazonwebservices.com/AmazonS3/latest/gsg/