Amazon AWS Tutorial I: Setting up AWS

Shuang Luan
Department of Computer Science
Department of Radiology
University of New Mexico
What is the Cloud?

- Cloud computing refers to a set of technologies offered as services over the Internet.
- Cloud service providers offer online computing resources (i.e. CPU time, storage, software, etc.), which are scalable to the user’s need based on a pay-as-you-go pricing model.
- Cloud computing offer users on-demand computing infrastructure, sized to fit the user’s momentary needs.
## Pricing

<table>
<thead>
<tr>
<th>EC2 Instance</th>
<th>Small</th>
<th>XL (High CPU)</th>
<th>Quad XL (High RAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compute Units</td>
<td>1</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>USD/hr</td>
<td>0.085</td>
<td>0.68</td>
<td>2.0</td>
</tr>
<tr>
<td>USD/(hr × Compute Unit)</td>
<td>0.085</td>
<td>0.034</td>
<td>0.0769</td>
</tr>
<tr>
<td>Architecture</td>
<td>32-bit</td>
<td>64-bit</td>
<td>64-bit</td>
</tr>
<tr>
<td>Memory</td>
<td>1.7GB</td>
<td>7GB</td>
<td>68.4GB</td>
</tr>
<tr>
<td>Storage</td>
<td>160GB</td>
<td>1690GB</td>
<td>1690GB</td>
</tr>
</tbody>
</table>

**TABLE I.** Amazon EC2 pricing for instances running Linux in US eastern region (as of April 2010).
Cloud Computing for the Clinics

• Cloud resources can be scaled to meet patient and physics QA demand as it fluctuates on a daily basis.
• Typical computing clusters often face “bursty” usage: left under-utilized much of the day (and night) and over-queued at peak periods.
• The cloud paradigm is particularly well suited for one-off calculations, such as machine commissioning and vault shielding calculations, for which a very large cluster might be desirable, but expanding to even a small cluster would be prohibitively expensive for a single run.
• Additionally, hardware upgrade and maintenance is taken care of by the provider, rather than by the user.
Medical Physics in the Cloud

• Monte Carlo calculations are well suited to cloud style distributed computation by their fundamental nature, as the primary particle histories are completely independent of one another, requiring no communication between processes. This means that calculations, while parallel, need not maintain data or timing synchronization during execution.
The Concept

Hospital Interface

Internet

Cloud Interface
Key Concepts

- **AWS** = Amazon Web Service
- **EC2** = Elastic Compute Cloud
- **AMI** = Amazon Machine Image
- **ECU (EC2 Compute Unit)** = The equivalent CPU capacity of a 1.0-1.2 GHz 2007 Opteron or 2007 Intel Xeon processor
- **S3** = Simple Storage Service
- **Zone** = Amazon EC2 locations are composed of Regions and Availability Zones, which are distinct physical locations.
- **Credential**: Enabling automatic access to AWS
Amazon EC2 Roadmap

• Create an Amazon AWS account
• Redeem AWS voucher/code
• Sign up for S3 storage (credit card information required)
• Sign up for EC2
Amazon AWS:
http://aws.amazon.com/
Amazon Web Services Sign In

You may sign in using your existing Amazon account or you can create a new account by selecting "I am a new user."

My e-mail address is: 

- 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?

Learn more about AWS Identity and Access Management and AWS Multi-Factor Authentication, features that provide additional security for your AWS Account.
Creating an Account (cont.)

Registration

New to Amazon.com? Register Below.

My name is:

My e-mail address is:

Type it again:

Protect your information with a password
This will be your only Amazon.com password.

Enter a new password:

Type it again:

Create account

About Amazon.com Sign In

Amazon.com Sign In allows you to log in to applications that use Amazon technology using your Amazon.com account. To protect your information, you should only enter your Amazon.com e-mail address and password into a web site if the address of the site starts with https://www.amazon.com (see your browser address bar to check this). You can find out about how your personal information is protected in our Privacy Notice.
Amazon Web Services Sign In

You may sign in using your existing Amazon account or you can create a new account by selecting "I am a new user."

My e-mail address is: siluan@cs.unm.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?

Learn more about AWS Identity and Access Management and AWS Multi-Factor Authentication, features that provide additional security for your AWS Account.
Amazon AWS Roadmap

• Create an Amazon AWS account
• Redeem AWS voucher/code
• Sign up for S3 storage (credit card information required)
• Sign up for EC2
Redeeming AWS Credit

http://aws.amazon.com/awscredits

AWS Credits

If you have received a promotion credits code or a grant for using AWS, you can easily update your account here.

Enter your claim code below and click Redeem. We'll add the credits to your AWS account.

General Credit Terms and Conditions:

1.1. Your promotion credits (Credits) may be used only for the Services designated by AWS when it grants the Credits (collectively, Eligible Services). You may not use your Credits for Reserved Instances or Premium Support.

1.2. Once your Credits are consumed, all additional use of the Services will be billed to your AWS account.

1.3. Your Credits are personal to you. You may not sell, license, rent, or otherwise transfer them. Your Credits may not be applied to any other account. Your Credits are not redeemable for cash.

1.4. Your Credits may not be used in conjunction with any other promotional or incentive offer from AWS. Your Credits can be applied only to the Eligible Services.

1.5. Your Credits are void in the event of fraud, misuse, or failure to satisfy any terms of the AWS Customer Agreement. In such case, we also reserve the right to seek reimbursement for credits already used and any other legal relief available.
Redeeming Credits (cont.)

Amazon Web Services Sign In

You may sign in using your existing Amazon account or you can create a new account by selecting "I am a new user."

My e-mail address is:  sluan@cs.unm.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?

Learn more about AWS Identity and Access Management and AWS Multi-Factor Authentication, features that provide additional security for your AWS Account.
Redeeming Credits (cont.)

AWS Credits

Please enter your contact information and confirm your acceptance of the AWS Customer Agreement.

Contact Information

Shuang Luan
MSC01-1130 1 Univ of New Mexico
Albuquerque, New Mexico 87131
505-277-9620

Company or Web Site Name:
Web Site URL:

AWS Customer Agreement

Amazon Web Services™ Customer Agreement
Last updated February 8, 2011

This AWS Customer Agreement (this “Agreement”) contains the terms and conditions that govern your access to and use of the Service Offerings (as defined below) and is an agreement between Amazon Web Services LLC (“AWS,” “we,” “us,” or “our”) and you or the entity you represent (“you”). This Agreement takes effect when you click an “I Accept” button or check box presented with these terms or, if earlier, when you use any of the Service Offerings (the “Effective Date”). You represent to us that you are lawfully able to enter into contacts (e.g., you are not a minor). If you

Security Check

Why do we ask you to type these characters?

Type the characters in the image:

Having Trouble? Contact us.

Continue
Redeeming Credits

AWS Credits

Success.

- You have created an Amazon Web Services Account. We have e-mailed you a confirmation and information about your new account.
- Your credits have been successfully redeemed. To begin using your EDULuanedeworkshop, you will need to sign up for AWS Data Transfer, Amazon Simple Notification Service, Amazon SES, AWS CloudFormation, Amazon S3, Amazon Route 53, Amazon VPC, Amazon CloudFront, Amazon SNS, Amazon SimpleDB, Amazon ClearBox, Amazon SQS, Amazon RDS, Amazon Elastic MapReduce, Amazon EC2, or AWS Elastic Beanstalk.

If you have received a promotional credits code or a grant for using AWS, you can easily update your account here.

Credits Balance: $100.00

Credits Details (as of last billing cycle - May 1, 2011):

<table>
<thead>
<tr>
<th>Credit Name</th>
<th>Applicable Products</th>
<th>Credits Used(s)</th>
<th>Credits Remaining(s)</th>
<th>Expiration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDULuanedeworkshop</td>
<td>CloudFormation, Route 53, VPC, CloudFront, SNS, SimpleDB, ClearBox, SQS, RDS, Elastic MapReduce, EC2, and AWS Elastic Beanstalk</td>
<td>0.00</td>
<td>100.00</td>
<td>04/30/2012</td>
</tr>
</tbody>
</table>

† Note: Credits are debited at the end of your monthly billing cycle. If your usage exceeds your credits balance, your payment method will be charged.
Redeeming Credits

Account Activity

Starting at 12:47AM PDT on April 21st, there was a service disruption (for a period of a few hours up to a few days) for Amazon EC2 and Amazon RDS that primarily involved a subset of the Amazon Elastic Block Store ("EBS") volumes in a single Availability Zone within our US East Region. You can read our detailed summary of the event here.

We are contacting (via email by 1:00am PDT on 4/29) those customers who are eligible to receive a service credit because they had an attached EBS volume or running RDS database instance in the affected Availability Zone at the time of the disruption. If you believe based on these criteria that you are eligible for a credit but have not received an email from us, please notify us here.

This Month's Activity as of May 10, 2011

The billing cycle for this report is May 1 - May 31, 2011. The AWS service usage charges on this page currently show activity through approximately 05/10/2011 10:59 GMT.

<table>
<thead>
<tr>
<th>Available Credits Summary</th>
<th>Credits Remaining($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Product(s)</td>
<td></td>
</tr>
<tr>
<td>Amazon Simple Notification Service, AWS</td>
<td></td>
</tr>
<tr>
<td>Data Transfer, SES, S3, AWS</td>
<td></td>
</tr>
<tr>
<td>CloudFormation, Route 53, VPC, CloudFront, SNS, SimpleDB, ClearBox, SQS, RDS, Elastic</td>
<td>$100.00</td>
</tr>
<tr>
<td>MapReduce, EC2, and AWS Elastic Beanstalk</td>
<td></td>
</tr>
</tbody>
</table>

$ Remaining amounts shown are as of the end of the last billing cycle (May 1, 2011). Credits will be applied to your account at the close of the billing cycle.

Expand All Services | Collapse All Services

Total new charges this billing cycle $0.00

No payments received to date.

Outstanding balance for this billing cycle's charges $0.00
Amazon EC2 Roadmap

• Create an Amazon AWS account
• Redeem AWS voucher/code
• Sign up for S3 storage (credit card information required)
• Sign up for EC2
Signing up for S3

You must sign up for Amazon S3 before you can use the Amazon S3 Console.

It's quick and free to sign up, just click the button below. (If you just signed up, it can take a few minutes for your account to become active. Click here to see your account activity.)

Sign Up For Amazon S3
Signing up for S3 (cont.)
Amazon Simple Storage Service

Pricing

AWS Free Usage Tier*
As part of AWS Free Usage Tier, you can get started with Amazon S3 for free. Upon sign-up, new AWS customers receive 5 GB of Amazon S3 storage, 20,000 Get Requests, 2,000 Put Requests, 15GB of bandwidth in and 15GB of bandwidth out each month for one year.

US Standard Region

Storage (Designed for 99.999999999% Durability)
$0.000 per GB - first 5 GB / month of storage used*
$0.140 per GB - first 1 TB / month of storage used beyond the global free tier
$0.125 per GB - next 49 TB / month of storage used
$0.110 per GB - next 450 TB / month of storage used
$0.095 per GB - next 500 TB / month of storage used
$0.080 per GB - next 4000 TB / month of storage used
$0.055 per GB - Storage used / month over 5000 TB

Reduced Redundancy Storage (Designed for 99.99% Durability)
$0.093 per GB - first 1 TB / month of storage used
$0.083 per GB - next 49 TB / month of storage used
$0.073 per GB - next 450 TB / month of storage used
$0.063 per GB - next 500 TB / month of storage used
$0.053 per GB - next 4000 TB / month of storage used
$0.037 per GB - Storage used / month over 5000 TB
Signing up for S3 (cont.)

* Your usage for the free tier is calculated each month across all regions and automatically applied to your bill - unused monthly usage will not roll over. Restrictions apply; see offer terms for more details.
** Rate tiers take into account your aggregate Data Transfer Out usage across Select AWS Services.
*** There is no charge for delete requests.

Data transfer "in" and "out" refers to transfer into and out of an Amazon S3 Region.
There is no Data Transfer charge for data transferred within an Amazon S3 Region via a COPY request. Data transferred via a COPY request between Regions is charged at regular rates.*
There is no Data Transfer charge for data transferred between Amazon EC2 and Amazon S3 within the same Region or for data transferred between the Amazon EC2 Northern Virginia Region and the Amazon S3 US Standard Region.
Data transferred between Amazon EC2 and Amazon S3 across all other Regions (i.e. between the Amazon EC2 Northern California and Amazon S3 US Standard Regions) will be charged at Internet Data Transfer rates on both sides of the transfer.**

Storage and bandwidth size includes all file overhead.

(Amazon S3 is sold by Amazon Web Services LLC.)

**Please Select a Payment Method**

All your future AWS service charges will be billed to the payment method you select. Should you need to do so, you will be able to change to another payment method in the future.

**Enter a Credit Card Below**

<table>
<thead>
<tr>
<th>Credit Card:</th>
<th>Credit Card Number:</th>
<th>Expiration Date:</th>
<th>Cardholder's Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visa</td>
<td></td>
<td>01/2011</td>
<td></td>
</tr>
</tbody>
</table>

[Continue]
Signing up for S3 (cont.)

Activating Subscription...

We are in the process of activating your subscription so that you can begin using this service. We will email you when your subscription becomes active so that you can begin using Amazon S3. For most customers, this process usually only take a couple minutes (but can sometimes take a few hours if additional account verification is required).

You will get an email at sluan@cs.unm.edu once your subscription to Amazon S3 is complete. You will then be able to begin using this service.

Thank you for your patience.

Start Exploring Amazon Simple Storage Service

- Resource Center
  Browse the resource center for code samples, documentation, release notes, and more information to help you build innovative applications. Subscribe to RSS feeds or set up e-mail watches to be alerted of the latest developments for this service.

- AWS Management Console
  A web-based, point-and-click, graphical user interface that makes it even easier to access and manage AWS Infrastructure Web Services.

- WSDL
- Developer Forums
- FAQs

Explore Other Amazon Web Services
Amazon EC2 Roadmap

• Create an Amazon AWS account
• Redeem AWS voucher/code
• Sign up for S3 storage (credit card information required)
• Sign up for EC2
You must sign up for Amazon EC2 before you can use the Amazon EC2 Console.
It’s quick and free to sign up, just click the button below.

Sign up for Amazon EC2
Sign up for EC2 (cont.)

Amazon Web Services Sign In

You may sign in using your existing Amazon account or you can create a new account by selecting "I am a new user."

- My e-mail address is: sluan@cs.unm.edu

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

  [Password input field]

  [Sign in using our secure server]

Forgot your password?
Has your e-mail address changed?

Learn more about AWS Identity and Access Management and AWS Multi-Factor Authentication, features that provide additional security for your AWS Account.
Identity Verification by Telephone

Identity verification by telephone is required to complete the sign up process. After you provide a telephone number where you can be reached you will then be called immediately by an automated system and prompted to enter the PIN number over the phone. Once completed you will be able to proceed to review your account details. Please follow the 3 simple steps below.

1. Provide a telephone number

Please enter your information below and click the "Call Me Now" button.

Country Code: United States (+1)  
Phone number:  
ext:  

2. Call in progress

3. Identity Verification Complete
Identity Verification by Telephone

Identity verification by telephone is required to complete the sign up process. After you provide a telephone number where you can be reached you will then be called immediately by an automated system and prompted to enter the PIN number over the phone. Once completed you’ll be able to proceed to review your account details. Please follow the 3 simple steps below.

- **✓ Provide a telephone number**

**Call in progress to +1 [Redacted]**

Please follow the instructions on the telephone and key in the following Personal Identification Number (PIN) on your telephone when prompted.

**Your PIN: 4787**

If you have not yet received a call at the number indicated above please wait. This page will automatically update with what you need to do next.

3. Identity Verification Complete
Sign up for EC2 (cont.)

Please review your selections and click “Complete Sign Up”

Amazon Elastic Compute Cloud uses Amazon Simple Storage Service to store and access your images. Your Amazon EC2 subscription will also enable your account to use Amazon Virtual Private Cloud and Amazon Simple Notification Service. You will not be charged for these services unless you decide to use them. After completing the sign-up process, you will have signed up to use Amazon SNS and VPC (You have already signed up to use Amazon S3).

Amazon Elastic Compute Cloud

Free tier for new AWS customers

New AWS customers will receive the following EC2 services each month for one year. Usage is calculated each month across all regions and automatically applied to your bill - unused monthly usage will not roll over. Restrictions apply; see offer terms for more details.

- 750 hours of Amazon EC2 running Linux/Unix Micro Instance usage (613 MB of memory and 32-bit and 64-bit platform support) - enough hours to run steady state each month
- 750 hours of Elastic Load Balancing plus 15 GB data processing
- 10 GB of Amazon Elastic Block Storage (EBS) plus 1 million IOs, 1 GB snapshot storage, 10,000 snapshot Get Requests and 1,000 snapshot Put Requests
- 15 GB of bandwidth in and 15 GB of bandwidth out aggregated across all AWS services

US-East (Northern Virginia) Region
Sign up for EC2 (cont.)

**US-East (Northern Virginia) Region**

**Amazon EC2 running Linux/UNIX**
- $0.085 per Small Instance (m1.small) instance-hour (or partial hour)
- $0.34 per Large Instance (m1.large) instance-hour (or partial hour)
- $0.66 per Extra Large Instance (m1.xlarge) instance-hour (or partial hour)
- $0.02 per Micro Instance (t1.micro) instance-hour (or partial hour)
- $0.50 per High-Memory Extra Large Instance (m2.xlarge) instance-hour (or partial hour)
- $1.00 per High-Memory Double Extra Large Instance (m2.2xlarge) instance-hour (or partial hour)
- $2.00 per High-Memory Quadruple Extra Large Instance (m2.4xlarge) instance-hour (or partial hour)
- $0.17 per High-CPU Medium Instance (c1.medium) instance-hour (or partial hour)
- $0.58 per High-CPU Extra Large Instance (c1.xlarge) instance-hour (or partial hour)
- $1.50 per Cluster Compute Quadruple Extra Large Instance (c2.4xlarge) instance-hour (or partial hour)
- $2.10 per Cluster GPU Quadruple Extra Large Instance (cg1.4xlarge) instance-hour (or partial hour)

**Amazon EC2 running SUSE Linux**
- $0.115 per Small SUSE Linux Instance (m1.small) instance-hour (or partial hour)
- $0.44 per Large SUSE Linux Instance (m1.large) instance-hour (or partial hour)
- $0.78 per Extra Large SUSE Linux Instance (m1.xlarge) instance-hour (or partial hour)
- $0.33 per Micro SUSE Linux Instance (t1.micro) instance-hour (or partial hour)
- $0.50 per High-Memory Extra Large SUSE Linux Instance (m2.xlarge) instance-hour (or partial hour)
- $1.10 per High-Memory Double Extra Large SUSE Linux Instance (m2.2xlarge) instance-hour (or partial hour)
- $2.10 per High-Memory Quadruple Extra Large SUSE Linux Instance (m2.4xlarge) instance-hour (or partial hour)
- $0.27 per High-CPU Medium SUSE Linux Instance (c1.medium) instance-hour (or partial hour)
- $0.78 per High-CPU Extra Large SUSE Linux Instance (c1.xlarge) instance-hour (or partial hour)
- $1.70 per Cluster Compute Quadruple Extra Large SUSE Linux Instance (c2.4xlarge) instance-hour (or partial hour)
- $2.20 per Cluster GPU Quadruple Extra Large SUSE Linux Instance (cg1.4xlarge) instance-hour (or partial hour)

**Amazon EC2 running Windows**
- $0.12 per Small Windows Instance (m1.small) instance-hour (or partial hour)
- $0.48 per Large Windows Instance (m1.large) instance-hour (or partial hour)
- $0.96 per Extra Large Windows Instance (m1.xlarge) instance-hour (or partial hour)
- $0.03 per Micro Windows Instance (t1.micro) instance-hour (or partial hour)
- $0.52 per High-Memory Extra Large Windows Instance (m2.xlarge) instance-hour (or partial hour)
- $1.24 per High-Memory Double Extra Large Windows Instance (m2.2xlarge) instance-hour (or partial hour)
- $2.48 per High-Memory Quadruple Extra Large Windows Instance (m2.4xlarge) instance-hour (or partial hour)
- $0.29 per High-CPU Medium Windows Instance (c1.medium) instance-hour (or partial hour)
- $1.16 per High-CPU Extra Large Windows Instance (c1.xlarge) instance-hour (or partial hour)

**Amazon EC2 running Windows with SQL Server Standard**
- $1.88 per Large Windows Instance and SQL Server Standard (m1.large) instance-hour (or partial hour)
- $1.55 per Extra Large Windows Instance and SQL Server Standard (m1.xlarge) instance-hour (or partial hour)
- $1.22 per High-Memory Extra Large Windows Instance and SQL Server Standard (m2.xlarge) instance-hour (or partial hour)
Sign up for EC2 (cont.)

Activating Subscription......
We are in the process of activating your subscription so that you can begin using this service. We will email you when your subscription becomes active so that you can begin using Amazon EC2. For most customers, this process usually only take a couple minutes (but can sometimes take a few hours if additional account verification is required).
You will get an email at sluon@cs.unm.edu once your subscription to Amazon EC2 is complete. You will then be able to begin using this service.
Thank you for your patience.

Resource Center
Browse the resource center for code samples, documentation, release notes, and more information to help you build innovative applications. Subscribe to RSS feeds or set up e-mail watches to be alerted of the latest developments for this service.

AWS Management Console
A web-based, point-and-click, graphical user interface that makes it even easier to access and manage AWS Infrastructure Web Services.

Auto Scaling, Amazon CloudWatch, Elastic Load Balancing
Check out additional EC2 features for building more resilient Web apps.

WSDL
Developer Forums
FAQs

Explore Other Amazon Web Services

Amazon Mechanical Turk: Register at the Amazon Mechanical Turk Requester web site to use the Amazon Mechanical Turk web service
Amazon CloudFront
Amazon Elastic Compute Cloud
Amazon Elastic MapReduce
Amazon DevPay
Amazon Flexible Payments Service
Amazon Fulfillment Web Service
Note

• You can always click on “AWS Management Console” return to the console.
• You will received several emails from Amazon informing you that you have signed up for S3, EC2, Virtual Private Cloud, Simple Notification Service, and etc. Depending on how many services you have signed up for.
• You are good to go …
Thank You.