

Basic Amazon Web Service (AWS) Lab 06





CSCIE 63 Big Data Analytics

Use Cases and Solutions, Application Hosting

- AWS, MS Azure, Google, and other offer a large number of products (services) that cater to many IT needs.
- Those services give users, i.e. application vendors, an easy way to use the massive computing power of the Cloud to host their programs as well as commercial software on the Internet.
- The following slide illustrate the multitude of those services offered by Amazon AWS.
- Other vendors offer similar services, typically somewhat fewer in numbers.

Amazon Web Services AWS Services

Compute

-  **EC2**
Virtual Servers in the Cloud
-  **EC2 Container Service**
Run and Manage Docker Containers
-  **Elastic Beanstalk**
Run and Manage Web Apps
-  **Lambda**
Run Code in Response to Events

Storage & Content Delivery

-  **S3**
Scalable Storage in the Cloud
-  **CloudFront**
Global Content Delivery Network
-  **Elastic File System** PREVIEW
Fully Managed File System for EC2
-  **Glacier**
Archive Storage in the Cloud
-  **Storage Gateway**
Integrates On-Premises IT Environments with Cloud Storage

Database

-  **RDS**
MySQL, Postgres, Oracle, SQL Server, and Amazon Aurora
-  **DynamoDB**
Predictable and Scalable NoSQL Data Store
-  **ElastiCache**
In-Memory Cache
-  **Redshift**
Managed Petabyte-Scale Data Warehouse Service

Networking

-  **VPC**
Isolated Cloud Resources
-  **Direct Connect**
Dedicated Network Connection to AWS
-  **Route 53**
Scalable DNS and Domain Name Registration

Developer Tools

-  **CodeCommit**
Store Code in Private Git Repositories
-  **CodeDeploy**
Automate Code Deployments
-  **CodePipeline**
Release Software using Continuous Delivery

Management Tools

-  **CloudWatch**
Monitor Resources and Applications
-  **CloudFormation**
Create and Manage Resources with Templates
-  **CloudTrail**
Track User Activity and API Usage
-  **Config**
Track Resource Inventory and Changes
-  **OpsWorks**
Automate Operations with Chef
-  **Service Catalog**
Create and Use Standardized Products

Security & Identity

-  **Identity & Access Management**
Manage User Access and Encryption Keys
-  **Directory Service**
Host and Manage Active Directory
-  **Trusted Advisor**
Optimize Performance and Security

Analytics

-  **EMR**
Managed Hadoop Framework
-  **Data Pipeline**
Orchestration for Data-Driven Workflows
-  **Kinesis**
Real-time Processing of Streaming Big Data
-  **Machine Learning**
Build Smart Applications Quickly and Easily

Mobile Services

-  **Cognito**
User Identity and App Data Synchronization
-  **Device Farm**
Test Android, Fire OS, and iOS apps on real devices in the Cloud
-  **Mobile Analytics**
Collect, View and Export App Analytics
-  **SNS**
Push Notification Service

Application Services

-  **API Gateway**
Build, Deploy and Manage APIs
-  **AppStream**
Low Latency Application Streaming
-  **CloudSearch**
Managed Search Service
-  **Elastic Transcoder**
Easy-to-use Scalable Media Transcoding
-  **SES**
Email Sending Service
-  **SQS**
Message Queue Service
-  **SWF**
Workflow Service for Coordinating Application Components

Enterprise Applications

-  **WorkSpaces**
Desktops in the Cloud
-  **WorkDocs**
Secure Enterprise Storage and Sharing Service
-  **WorkMail** PREVIEW
Secure Email and Calendaring Service

EC2, Elastic Cloud Computing

- Perhaps the most important AWS service is EC2, Elastic Cloud Computing service, which lets you rent Amazon AMI-s (Amazon Machine Images) per hour and in unlimited number.
- A typical AMI is XEN image (a Virtual Machine), pre-configured and available on demand from AWS
 - Users can customize AMIs and then store them for reuse
 - Users can allocate storage and mount it to AMI-s as needed
 - The same storage device could be mounted to different AMI's

Simple Storage Service, S3

- Even as storage becomes more plentiful and affordable, businesses are still faced with the task of managing their growing storage infrastructure.
- Amazon Web Services provides a cost-effective solution for storing information in the cloud that eliminates the burden of provisioning and managing hardware.
- Amazon Simple Storage Service (Amazon S3) is a highly scalable, reliable, and inexpensive data storage infrastructure that enables dependable backup solutions.
- Hundreds of thousands of customers use Amazon S3 as their backup location, and other customers have created compelling end-user backup, storage, and disaster recovery solutions using AWS

Amazon Simple Storage Service (S3)

- S3 is the most basic storage service
- Flat storage model consisting of buckets and objects
 - Bucket – has a name and contains objects
 - Bucket name has to be globally unique
 - Objects – has a key, stores 1 byte - 5GB
 - Object key can look like a path
- Cost:
 - \$0.125/GB-Month
 - \$0.10-0.18/GB of data transferred
 - Data transfers between EC2 and S3 are free of bandwidth charges
- Buckets and objects can be:
 - Public – accessible by anyone
 - Private – accessible to owner, ACL member

Some EC2 Instance types

* 1 EC2 Compute Unit is equivalent to a 1.0-1.2 GHz Opteron or Xeon processor

Type	CPU*	Memory	Storage	Platform
Small (default)	1 EC2 Compute Unit	1.7 GB	160 GB	32-bit
Large	4 EC2 Compute Units	7.5 GB	850 GB	64-bit
Extra large	8 EC2 Compute Units	15 GB	1690 GB	64-bit
High CPU Medium	5 EC2 Compute Units	1.7 GB	350 GB	32-bit
High CPU Extra large	30 EC2 Compute Units	222 GB	1690 GB	64-bit

Dual IPs and Security Groups

- All AMIs come with public IP addresses
 - Security groups allow you to configure which ports to open up for external inbound access
 - Each entry in a Security Group has a protocol, port number and optionally a subnet mask to restrict access by IP address
 - A Security Group must be allocated to an AMI before it is started
 - You can add/delete entries to a security group allocated to one or several AMI-s with out having to restart the AMI. Modifications to the security group affect running AMI-s
- AMIs have one Private IP address that can be used for access by other machines in the AWS Cloud.

Volatile vs. Elastic Block Storage

There are 2 types of storage and 2 types of machine:

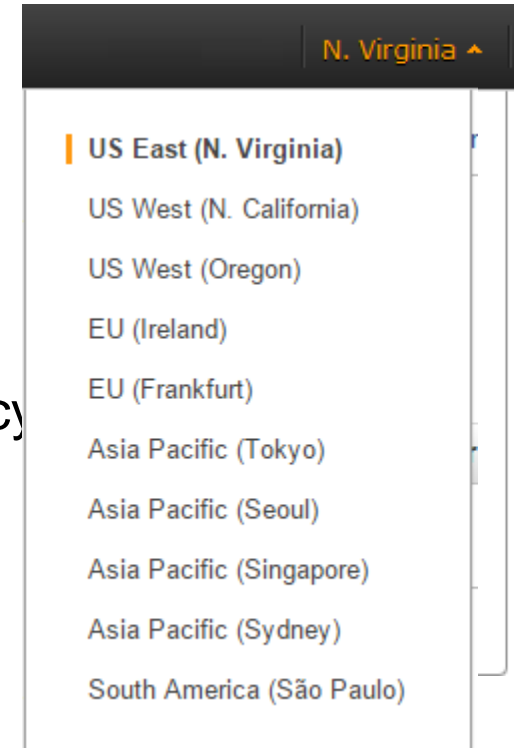
- 1) Ephemeral (Volatile) storage: when an AMI is terminated all local data is lost. Machines with volatile storage are called Instance Store AMI-s
- 2) Elastic Block Store and EBS AMI-s
 - Mountable storage volume, like an attachable/detachable drive
 - “SAN on demand”
 - From 1Gb to 1Tb
 - Significantly faster than AMI volatile storage
 - Mounts on a single AMI only
 - Can mount several on a single AMI
 - Cost
 - \$0.10/Gb per month (based on size of volume not amount used)
 - \$0.10/1 million I/O requests

Elastic IP Addresses

- AMI IP addresses are allocated on startup
 - Most likely will get a unique IP every time
 - Big inconvenience for public sites
- Elastic IP addresses:
 - Statically allocated addresses
 - Associated with your account
 - Attached to an instance (e.g. public facing web server)
 - Can attach an Elastic IP address to another instance if you need to switch AMIs
 - You configure DNS to resolve to the elastic IP address
 - No cost for Elastic IP addresses while in use
 - * \$0.01 per non-attached Elastic IP address per complete hour
 - * \$0.00 per Elastic IP address remap – first 100 remaps / month
 - * \$0.10 per Elastic IP address remap – additional remap / month over 100

Regions and Availability Zones

- In a failover DB server configuration your standby server could run on the same physical machine
- Regions:
 - Geographically dispersed locations
 - Currently there are 10 regions
 - Work in the region where your live. Lower latency
- Availability zone:
 - Part of a region
 - Engineered to be insulated from failure in
 - other zones
- Specify availability zone when launching instances:
 - Same zone for all instances in your cluster for fast data transfer



Getting started with Amazon Web Services



- Signing up is easy
 - Credit card required but no charge for signing up
- 4 important pieces of information that you will need post sign up
 - Account Id
 - Access Id
 - Secret key
 - Private key and certificate files
- You need a phone to confirm your identity.

Information that you need to keep after signing up

- Various combinations of security information generated during sign up are needed for the EC2 API, S3 and other Tools
 - Account Number
 - Currently a 12 digit number
 - Access Id and Secret key
 - Long Character strings
 - Private key and certificate
 - Long character strings that need to be downloaded and stored as files
- This information should be closely guarded.
- Someone could burn real money and create serious bills on your Visa account.

One time setup required prior to working with IBM AMIs

- Generate a key pair
 - Generated the private key and certificate that are saved after signing up
 - Associated with the AMIs that you start and are needed for remote access via SSH to those AMIs

AMI Usage Flow

- Register for AWS (registration is free but Credit Card is required)
- Generate key pair private key and certificate
- Create Security Group(s)
- Activate one or more AMIs
- Configure remote access
 - SSH is preferred method
- Upload any code or data you require
- Customize image
- Allocate permanent storage
 - Volatile storage goes away when the AMI stops running
- Save changes to image
 - Storage costs incurred for saving images and running them

AWS Home, Select

Sign In to the Console



AWS SOLUTIONS: WEBSITES

Build your website on AWS with scalability, low cost and low latency



AWS MOBILE HUB

The fastest way to build mobile apps on AWS. Sign up for a free account today



GETTING STARTED

Learn how to start using AWS in minutes



AWS FREE TIER

Gain hands-on experience with AWS free for 12 months

Select “I am a new user”



Sign In or Create an AWS Account

What is your e-mail or mobile number?

E-mail or mobile number:

djordjevic.blasko@gmail.com

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

.....

Sign in using our secure server



[Forgot your password?](#)

Provide Name, Create Password



Login Credentials

Use the form below to create login credentials that can be used for AWS as well as Amazon.com.

My name is:	<input type="text" value="Djordjevic, Blagoje"/>
My e-mail address is:	<input type="text" value="djordjevic.blasko@gmail.com"/>
Type it again:	<input type="text" value="djordjevic.blasko@gmail.com"/>
<small>note: this is the e-mail address that we will use to contact you about your account</small>	
Enter a new password:	<input type="password" value="••••••••"/>
Type it again:	<input type="password" value="••••••••"/>
<input type="button" value="Create account"/>	

- On the following screens you will be asked for your address and phone, the credit card and phone verification. Be positive, answer the phone. You are in.

Enter Contact Information, Create Account and ...

Contact Information

☐ Company Account ☒ Personal Account

** Required Fields*

Full Name*

Djordjevic, Blagoje

Country*

United States ▼

Address*

1234 Main St.

Apartment, suite, unit, building, floor, etc.

City*

San Francisco

State / Province or Region*

CA


Postal Code*

94102

Phone Number*

610-123-4567

Security Check ?


Refresh Image

Please type the characters as shown above

URCHJU|

AWS Customer Agreement

☐ Check here to indicate that you have read and agree to the terms of the [AWS Customer Agreement](#)

Create Account and Continue

Enter Payment Information



Payment Information

Please enter your payment information below. You will be able to try a broad set of AWS products for free via the Free Usage Tier. We will only bill your credit or debit card for usage that is not covered by our Free Usage Tier.

AWS Free Usage Tier	Compute Amazon EC2	Storage Amazon S3	Database Amazon RDS
free for 1 year	750hrs/month*	5GB	750hrs/month*

[*View full offer details »](#)

Credit/Debit Card Number

4111 1234 5678 9010

Expiration Date

03 / 01

Cardholder's Name

Djordjevic

☐ Use my contact address

1000 S. 1st Avenue, Suite 100, San Jose, CA 95128

☒ Use a new address

* Required Fields

Full Name*

Djordjevic

Identity Verification



Identity Verification

You will be called immediately by an automated system and prompted to enter the PIN number provided.

1. Provide a telephone number

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

Country Code

United States (+1)

Phone Number

617-

Ext

Call Me Now

2. Call in progress

3. Identity verification complete

Enter PIN into your Phone Pad



Identity Verification

You will be called immediately by an automated system and prompted to enter the PIN number provided.

1. Provide a telephone number ✓

2. Call in progress

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

PIN: 0910

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

Continue to Select your Support Plan



Identity Verification

You will be called immediately by an automated system and prompted to enter the PIN number provided.

1. Provide a telephone number ✓

2. Call in progress ✓

3. Identity verification complete

Your identity has been verified successfully

Continue to select your Support Plan

Select Support Plan

Support Plan

All customers receive free support. Choosing a paid support plan will allow you to receive one-on-one technical assistance from experienced engineers and access many other support features. Please see below.

Please Select One

☒ **Basic (Free)**

Contact Customer Service for account and billing questions, receive help for resources that don't pass system health checks, and access the AWS Community Forums.

☐ **Developer (\$49/month)**

Get started on AWS - ask technical questions and get a response to your web case within 12 hours during local business hours.

☐ **Business (Starting at \$100/month - Pricing Example) - Recommended**

24/7/365 real-time assistance by phone and chat, a 1 hour response to web cases, and help with 3rd party software. Access AWS Trusted Advisor to increase performance, fault tolerance, security, and potentially save money. ?


☐ **Enterprise**

15 minute response to web cases, an assigned technical account manager (TAM) who is an expert in your use case, and white-glove case handling that notifies your TAM and the service engineering team of a critical issue.

If you select this option, you will not be charged immediately. We will contact you to discuss your needs and finalize the signup.

Continue

Complete Sign Up



The screenshot shows the AWS registration confirmation page. At the top, the browser address bar displays `https://aws.amazon.com/registration-confirmation/`. The navigation bar includes a 'Menu' icon, the 'amazon web services' logo, and links for 'Products', 'Solutions', 'Pricing', 'Software', 'Support', 'Customers', 'Partners', 'More', 'English', and 'My Account'. A yellow 'Complete Sign Up' button is on the right. The main content area features the heading 'Welcome to Amazon Web Services' in orange, followed by a paragraph of text and two buttons: 'Sign In to the Console' and 'Contact Sales'. Below this is a section titled 'Try AWS with a 10-Minute Tutorial' which contains four tutorial cards, each with a clock icon and a title.

→ ↻ 🏠 <https://aws.amazon.com/registration-confirmation/>

Menu **amazon** web services Products Solutions Pricing Software Support Customers Partners More ▾ English ▾ My Account ▾ [Complete Sign Up](#)


Welcome to Amazon Web Services

Thank you for creating an Amazon Web Services (AWS) Account. We are in the process of activating your account. For most customers, activation only takes a couple minutes, but it can sometimes take a few hours if additional account verification is required. We will notify you by email when your account is activated.


[Sign In to the Console](#)

[Contact Sales](#)


Try AWS with a 10-Minute Tutorial




10-Minute Tutorial
Launch a Linux VM
using Amazon EC2



10-Minute Tutorial
Store Your Files in the Cloud
with Amazon S3



10-Minute Tutorial
Launch a WordPress Website
with Amazon EC2 and AWS Marketplace



10-Minute Tutorial
Launch a Web Application
with AWS Elastic Beanstalk

Sign in to the AWS Console



Sign In or Create an AWS Account

What is your e-mail or mobile number?

E-mail or mobile number:

djordjevic.blasko@gmail.com

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

.....

Sign in using our secure server




[Forgot your password?](#)







You will see a page with all AWS Services

← → ↻ 🏠 <https://console.aws.amazon.com/console/home?region=us-east-1>







 **AWS** ▾ **Services** ▾ Edit ▾

Amazon Web Services






Compute

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-  **Glacier**
Archive Storage in the Cloud
-  **Import/Export Snowball**
Large Scale Data Transport
-  **Storage Gateway**
Hybrid Storage Integration








Database

-  **RDS**
Managed Relational Database Service
-  **DynamoDB**
Managed NoSQL Database
-  **ElastiCache**
In-Memory Cache
-  **Redshift**
Fast, Simple, Cost-Effective Data Warehousing
-  **DMS** PREVIEW






Developer Tools

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Store Code in Private Git Repositories
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Automate Code Deployments
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Release Software using Continuous Delivery


Management Tools

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-  **Service Catalog**
Create and Use Standardized Products
-  **Trusted Advisor**
Optimize Performance and Security


Security & Identity

-  **Identity & Access Management**
Manage User Access and Encryption Keys
-  **Directory Service**
Host and Manage Active Directory
-  **Inspector** PREVIEW
Analyze Application Security
-  **WAF**
Filter Malicious Web Traffic
-  **Certificate Manager**






Internet of Things

-  **AWS IoT**
Connect Devices to the Cloud







Game Development

-  **GameLift**
Deploy and Scale Session-based Multiplayer Games

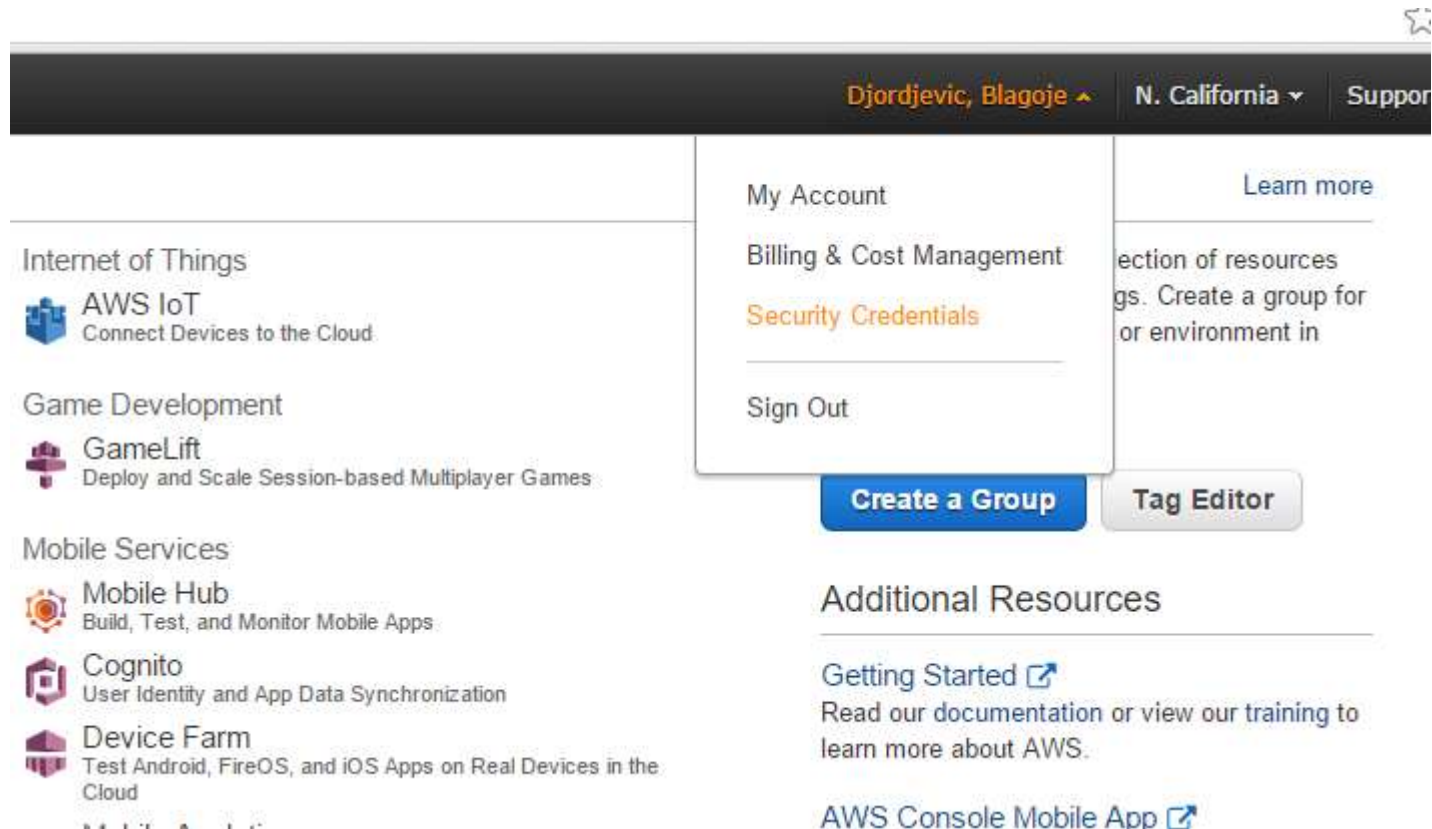
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Easy-to-Use Scalable Media Transcoding
-  **SES**
Email Sending and Receiving Service
-  **SQS**
Message Queue Service

After Signing in, go to Security Credentials



On the next screen again select Continue to Security Credentials

Security Credentials

- You already have password. Other credentials you need to create.
- Multi-Factor Authentication and CloudFront Key Pairs can be ignored for now.
- Select Access Keys:

Your Security Credentials

Use this page to manage the credentials for your AWS account. To manage credentials for AWS Identity and Access Management (IAM) users, To learn more about the types of AWS credentials and how they're used, see [AWS Security Credentials](#) in AWS General Reference.

+	Password
+	Multi-Factor Authentication (MFA)
+	Access Keys (Access Key ID and Secret Access Key)
+	CloudFront Key Pairs
+	X.509 Certificates
+	Account Identifiers

Hit Create New Access Key

Your Security Credentials

Use this page to manage the credentials for your AWS account. To manage credentials for AWS Identity and Access Management (IAM) users, use the [IAM Console](#).

To learn more about the types of AWS credentials and how they're used, see [AWS Security Credentials](#) in AWS General Reference.


+	Password
+	Multi-Factor Authentication (MFA)
-	Access Keys (Access Key ID and Secret Access Key)

You use access keys to sign programmatic requests to AWS services. To learn how to sign requests using your access keys, see the [signing documentation](#). For your protection, keep your access keys secure and do not share them. In addition, AWS recommends that you rotate your access keys every 90 days.

Note: You can have a maximum of two access keys (active or inactive) at a time.

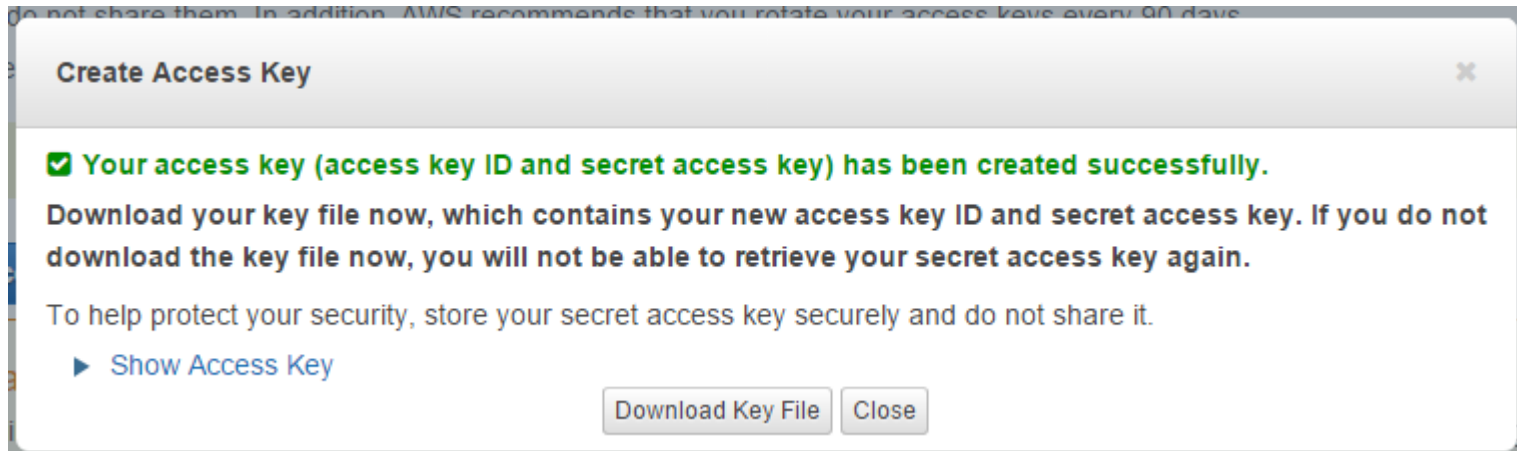
Created	Deleted	Access Key ID	Last Used	Last Used Region	Last Used Service	Status
---------	---------	---------------	-----------	------------------	-------------------	--------

Create New Access Key

 **Important Change - Managing Your AWS Secret Access Keys**
As described in a [previous announcement](#), you cannot retrieve the existing secret access keys for your AWS root account, though you can still create a new root access key. As a [best practice](#), we recommend [creating an IAM user](#) that has access keys rather than relying on root access keys.

+	CloudFront Key Pairs
+	X.509 Certificates
+	Account Identifiers

Download Access Key File



- File named `rootkey.csv` was downloaded to your hard drive.
- Save that file it contains to important credentials:

`AWSAccessKey=ETWEHJGKHDOBEKBRA`

`AWSSecretKey=hl1BVgjWddgdfrsjdfopsefkxd1P60VIp3DkX3`

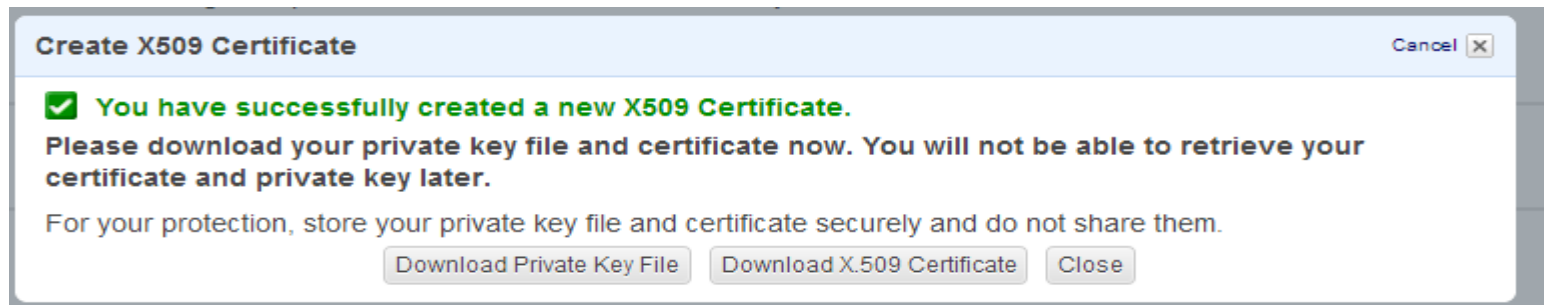
Generate X509 Certificate and Private Key

[-] X.509 Certificates

Note: You can have a maximum of two X.509 certificates (active or inactive) at a time.

Created	Deleted	Thumbprint	Status	Actions
<div>Create New Certificate Upload Your Own Certificate</div>				

- Private key can be downloaded only once.
- Hit “Create New Certificate”



- Download and save both the Private Key and X.509 Certificate as separate files. Store them in a standard directory
- Certificate is your public key, you can show it to anyone.
- Private key is very secret.
- Never show private key to anyone.

Name	Date modified
New folder	9/6/2013
cert-1BTWDOGZLCLE73BTSHKMEFXOYGVZINQP.pem	9/6/2013
credentials	9/6/2013
pk-1BTWDOGZLCLE73BTSHKMEFXOYGVZINQP.pem	9/6/2013

Launch Instance

- Sign in to AWS Management Console. Select EC2 Service.
- Select Launch Instance. Notice “N. Virginia”. This my region. If you are in Europe or Asia you should select a different region.

The screenshot shows the AWS Management Console interface for the EC2 service in the N. Virginia region. The left sidebar contains navigation links for the EC2 Dashboard, INSTANCES, IMAGES, ELASTIC BLOCK STORE, and NETWORK & SECURITY. The main content area is divided into three sections: Resources, Create Instance, and Service Health. The Resources section shows 0 Running Instances, 0 Elastic IPs, 0 Volumes, 0 Snapshots, 0 Key Pairs, 0 Load Balancers, 0 Placement Groups, and 3 Security Groups. The Create Instance section includes a 'Launch Instance' button and a note about the region. The Service Health section shows that the US East (N. Virginia) service is operating normally. The right sidebar displays account attributes and popular AMIs on the AWS Marketplace.

Services ▾ **Edit** ▾ Zoran Djordjevic ▾ N. Virginia ▾

EC2 Dashboard

- Events
- Tags

INSTANCES

- Instances
- Spot Requests
- Reserved Instances

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK & SECURITY

- Security Groups
- Elastic IPs
- Placement Groups
- Load Balancers
- Key Pairs
- Network Interfaces

Resources

You are using the following Amazon EC2 resources in the US East (N. Virginia) region:

0 Running Instances	0 Elastic IPs
0 Volumes	0 Snapshots
0 Key Pairs	0 Load Balancers
0 Placement Groups	3 Security Groups

[Optimize your resources' cost, performance and security with AWS Trusted Advisor.](#) [Hide](#)

Create Instance

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

[Launch Instance](#)

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

Service Health

Service Status:

- US East (N. Virginia): This service is operating normally

Availability Zone Status:

- us-east-1a: Availability zone is operating normally

Scheduled Events

US East (N. Virginia):

- No events

Account Attributes

Supported Platforms

- EC2-Classical
- EC2-VPC

Additional Information

- Getting Started Guide
- Documentation
- All EC2 Resources
- Forums
- Pricing
- Contact Us

Popular AMIs on AWS Marketplace

Debian GNU/Linux

Provided by Debian
Rating ★★★★★
Free Software, pay only for A usage
[View all Operating Systems](#)

Couchbase Server - Commur Edition

Provided by Couchbase
Rating ★★★★★
Free Software, pay only for A

Create New Instance, Continue

Create a New Instance

Cancel

Select an option below:

- Classic Wizard**
Launch an On-Demand or Spot instance using the classic wizard with fine-grained control over how it is launched.
- Quick Launch Wizard**
Launch an On-Demand instance using an editable, default configuration so that you can get started in the cloud as quickly as possible.
- AWS Marketplace**
AWS Marketplace is an online store where you can find and buy software that runs on AWS. Launch with 1-Click and pay by the hour.

Launch with the Classic Wizard

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 2011.02.1 Beta (AMI Id: ami-8c1feca5) Amazon Linux AMI Base 2011.02.1, EBS boot, 32-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GB	 Select
	Basic 64-bit Amazon Linux AMI 2011.02.1 Beta (AMI Id: ami-8e1feca7) Amazon Linux AMI Base 2011.02.1, EBS boot, 64-bit architecture with Amazon EC2 AMI Tools. Root Device Size: 8 GB	 Select
	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	Select
	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	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 GB	Select

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

Continue

[Submit Feedback](#) [Getting Started Guide](#)

Select “Community AMIs” tab

Request Instances Wizard Cancel

CHOOSE AN AMI

INSTANCE DETAILS

CREATE KEY PAIR

CONFIGURE FIREWALL

REVIEW





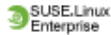




Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.


Quick Start

My AMIs

Community AMIs

AWS Marketplace

	Amazon Linux AMI 2013.03.1 The Amazon Linux AMI is an EBS-backed, PV-GRUB image. It includes Linux 3.4, AWS tools, and repository access to multiple versions of MySQL, PostgreSQL, Python, Ruby, and Tomcat. Root Device Size: 8 GB	<input type="radio"/> 64 bit <input checked="" type="radio"/> 32 bit		Select
	Red Hat Enterprise Linux 6.4 Red Hat Enterprise Linux version 6.4, EBS-boot. Root Device Size: 0 GB	<input checked="" type="radio"/> 64 bit <input type="radio"/> 32 bit		Select
	SUSE Linux Enterprise Server 11 SUSE Linux Enterprise Server 11 Service Pack 3 basic install, EBS boot with Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.5, PHP 5.3, and Ruby 1.8.7 available Root Device Size: 0 GB	<input checked="" type="radio"/> 64 bit <input type="radio"/> 32 bit		Select
	Ubuntu Server 12.04.2 LTS Ubuntu Server 12.04.2 LTS with support available from Canonical (http://www.ubuntu.com/cloud/services). Root Device Size: 8 GB	<input checked="" type="radio"/> 64 bit <input type="radio"/> 32 bit		Select
	Ubuntu Server 13.04 Ubuntu Server version 13.04, with support available from Canonical			Select

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

Enter bitnami-tomcat in Search Criteria

Step 1: Choose an Amazon Machine Image (AMI)

[Cancel and Exit](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

The screenshot shows the AWS IAM console interface. On the left, there is a sidebar with navigation options: 'Quick Start', 'My AMIs', 'AWS Marketplace', and 'Community AMIs'. Under 'Community AMIs', there is a section for 'Operating system' with checkboxes for Amazon Linux, Cent OS, Debian, Fedora, Gentoo, OpenSUSE, Other Linux, Red Hat, SUSE Linux, Ubuntu, and Windows. Below this is a section for 'Architecture' with a checkbox for 32-bit. The main area shows a search bar with 'bitnami-tomcat' entered. Below the search bar, there is a section for 'aws marketplace' with the text '6 results for "bitnami-tomcat" on AWS Marketplace' and 'Partner software pre-configured to run on AWS'. The results are listed in a table with columns for the AMI name, URL, root device type, virtualization type, and a 'Select' button. The first four results are:

AMI Name	URL	Root device type	Virtualization type	Architecture
bitnami-tomcatstack-8.0.8-0-dev-linux-ubuntu-12.04.4-x86_64-ebs - ami-039c301e	https://bitnami.com	ebs	paravirtual	64-bit
bitnami-tomcatstack-6.0.39-0-linux-ubuntu-12.04.3-i386-ebs-2 - ami-0bd87516	https://bitnami.com	ebs	paravirtual	32-bit
bitnami-tomcatstack-7.0.50-0-linux-ubuntu-12.04.3-x86_64-ebs-2 - ami-0bdb7616	https://bitnami.com	ebs	paravirtual	64-bit
bitnami-tomcatstack-6.0.39-0-linux-ubuntu-12.04.3-x86_64-ebs-2 - ami-0fd87512	https://bitnami.com	ebs	paravirtual	64-bit

- Do not choose an AMI with `aws-marketplace` prefix. Those need an additional authorization and some additional payments.. Select for example `ami-008db468`

Choose Micro Instance Type, Leave No Preference for Availability Zone

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types All generations [Show/Hide Columns](#)

Currently selected: t1.micro (Variable ECUs, 1 vCPUs, 0.613 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
<input checked="" type="checkbox"/>	Micro instances	t1.micro Free tier eligible	1	0.613	EBS only	-	Very Low
<input type="checkbox"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	m3.medium	1	3.75	1 x 4 (SSD)	-	Moderate

- On the following, Configure Instance Details Screen, take the defaults and hit Continue.
- On the Add Storage screen, leave defaults, Continue.
- On the Tag instance screen provide some name in the Value field, e.g. My Tomcat server. Continue.

Create New Key Pair

- The next screen is introducing “Key Pair”. We do not have one, so let us select “Create a new Key Pair”.



The screenshot shows the 'Request Instances Wizard' window. The title bar includes a 'Cancel' button. The wizard has five steps: CHOOSE AN AMI, INSTANCE DETAILS, CREATE KEY PAIR (current step), CONFIGURE FIREWALL, and REVIEW. The 'CREATE KEY PAIR' step is highlighted with a progress bar. Below the steps, there is explanatory text about key pairs for Windows and Linux instances. The main content area has two radio buttons: 'Choose from your existing Key Pairs' and 'Create a new Key Pair' (which is selected). Under 'Create a new Key Pair', there are two numbered instructions. Instruction 1 is 'Enter a name for your key pair:*' with a text input field containing 'hu2013' and a placeholder '(e.g., jdoekey)'. Instruction 2 is 'Click to create your key pair:*' with a yellow button labeled 'Create & Download your Key Pair'. Below the button is a speech bubble icon and text: 'Save this file in a place that 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.' At the bottom, there is a radio button for 'Proceed without a Key Pair', a '< Back' button, and a 'Continue >' button.

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. For Windows Server instances, a Key Pair is required to set and deliver a secure encrypted password. For Linux server instances, a key pair allows you to SSH into your instance.

To create a key pair, enter a name and click **Create & Download Your Key Pair**. You will 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 that 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 >

- Save the file, `ec2hu.pem`, in my case, to a safe location.
- Next time you launch an instance, can use the same Key Pair.

Select Security Group

- For now, please select the default security group. Continue.

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: ☐ Create a **new** security group
☒ Select an **existing** security group

Filter

Security Group ID	Name	Description	Actions
<input checked="" type="checkbox"/> sg-7aaa0967	default	default group	Copy to new

Inbound rules for sg-7aaa0967 (Selected security groups: sg-7aaa0967)



Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ
All ICMP	All	N/A	sg-7aaa0967 (default)
All TCP	TCP	0 - 65535	sg-7aaa0967 (default)
All UDP	UDP	0 - 65535	sg-7aaa0967 (default)
SSH	TCP	22	0.0.0.0/0
HTTP	TCP	80	0.0.0.0/0

Enable Cloud Watch

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 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 Monitoring for this instance
(additional charges will apply)

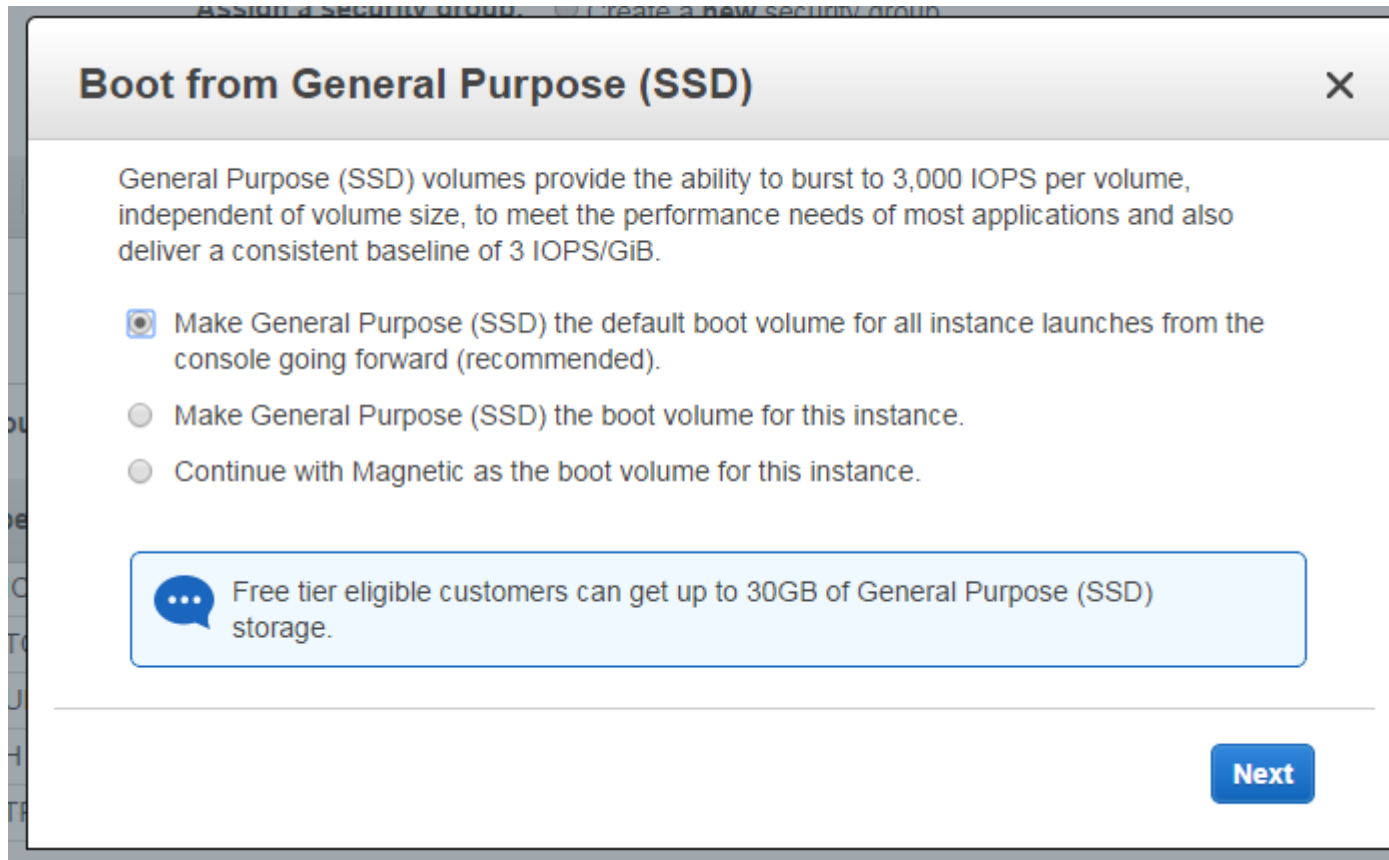
User Data:

☐ base64 encoded

Back Continue

Boot from General Purpose (SSD) Volume

- If not too expensive always choose Solid State Drive (SSD)



The screenshot shows a dialog box titled "Boot from General Purpose (SSD)" with a close button (X) in the top right corner. The dialog contains the following text:

General Purpose (SSD) volumes provide the ability to burst to 3,000 IOPS per volume, independent of volume size, to meet the performance needs of most applications and also deliver a consistent baseline of 3 IOPS/GiB.

Below this text are three radio button options:

- ☒ Make General Purpose (SSD) the default boot volume for all instance launches from the console going forward (recommended).
- ☐ Make General Purpose (SSD) the boot volume for this instance.
- ☐ Continue with Magnetic as the boot volume for this instance.

At the bottom of the dialog, there is a light blue callout box with a speech bubble icon containing the text: "Free tier eligible customers can get up to 30GB of General Purpose (SSD) storage."

In the bottom right corner of the dialog, there is a blue button labeled "Next".

Review Instance Description, Launch

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.



Improve your instance's security. Your security group, default, is open to the world.

Your instance may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.

You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

▼ AMI Details

[Edit AMI](#)

bitnami-tomcatstack-6.0.39-0-linux-ubuntu-12.04.3-i386-ebs-2 - ami-0bd87516

<https://bitnami.com>

Root Device Type: ebs Virtualization type: paravirtual

▼ Instance Type

[Edit instance type](#)

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t1.micro	Variable	1	0.613	EBS only	-	Very Low

▼ Security Groups

[Edit security groups](#)

Security Group ID	Name	Description
sg-7aaa0967	default	default group

All selected security groups inbound rules

[Cancel](#)[Previous](#)[Launch](#)

Review Instance Description, Launch

Request Instances WizardCancel

✓

✓


✓

✓

○

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

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

AMI:  Ubuntu AMI ID ami-0e671967 (i386) [Edit AMI](#)

Number of Instances: 1

Availability Zone: No Preference

Instance Type: T1 Micro (t1.micro)

Instance Class: On Demand [Edit Instance Details](#)

EBS-Optimized: No

Monitoring: Disabled **Termination Protection:** Disabled

Tenancy: Default

Kernel ID: Use Default **Shutdown Behavior:** Stop

RAM Disk ID: Use Default

Network Interfaces:


Secondary IP Addresses:

User Data:

IAM Role: [Edit Advanced Details](#)

Key Pair Name: hu2013 [Edit Key Pair](#)

Security Group(s): sg-edcf2c84 [Edit Firewall](#)

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

Select an existing key pair or create a new

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Create a new key pair

Key pair name

ec2hu

Download Key Pair

You have to download the **private key file** (*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

Cancel

Launch Instances

If asked confirm that you do have the key pair

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

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Create a new key pair

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ec2hu

Download Key Pair

You have to download the **private key file** (*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

Cancel

Launch Instances

Instance is Launching

Launch Status



Your instance is now launching

The following instance launch has been initiated: [i-db9027ce](#) [View launch log](#)



Get notified of estimated charges

[Create billing alerts](#) to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

How to connect to your instance

Your instance is launching, and it may take a few minutes until it is in the **running** state, when it will be ready for you to use. Usage hours on your new instance will start immediately and continue to accrue until you stop or terminate your instance.

Click **View Instances** to monitor your instance's status. Once your instance is in the **running** state, you can **connect** to it from the Instances screen. [Find out](#) how to connect to your instance.

▼ Here are some helpful resources to get you started

- [How to connect to your Linux instance](#)
- [Amazon EC2: User Guide](#)
- [Learn about AWS Free Usage Tier](#)
- [Amazon EC2: Discussion Forum](#)

While your instances are launching you can also

[Create status check alarms](#) to be notified when these instances fail status checks. (Additional charges may apply)

[Create and attach additional EBS volumes](#) (Additional charges may apply)

[Manage security groups](#)

[View Instances](#)

My Instances

Launch Instance Connect Actions ▾

search : ami-008db468 x Add filter ? < 1 to 1 of 1

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm State
	i-72925bd1	t1.micro	us-east-1e	running	2/2 checks...	None

Public (DNS) name of new instance

Description Status Checks Monitoring Tags

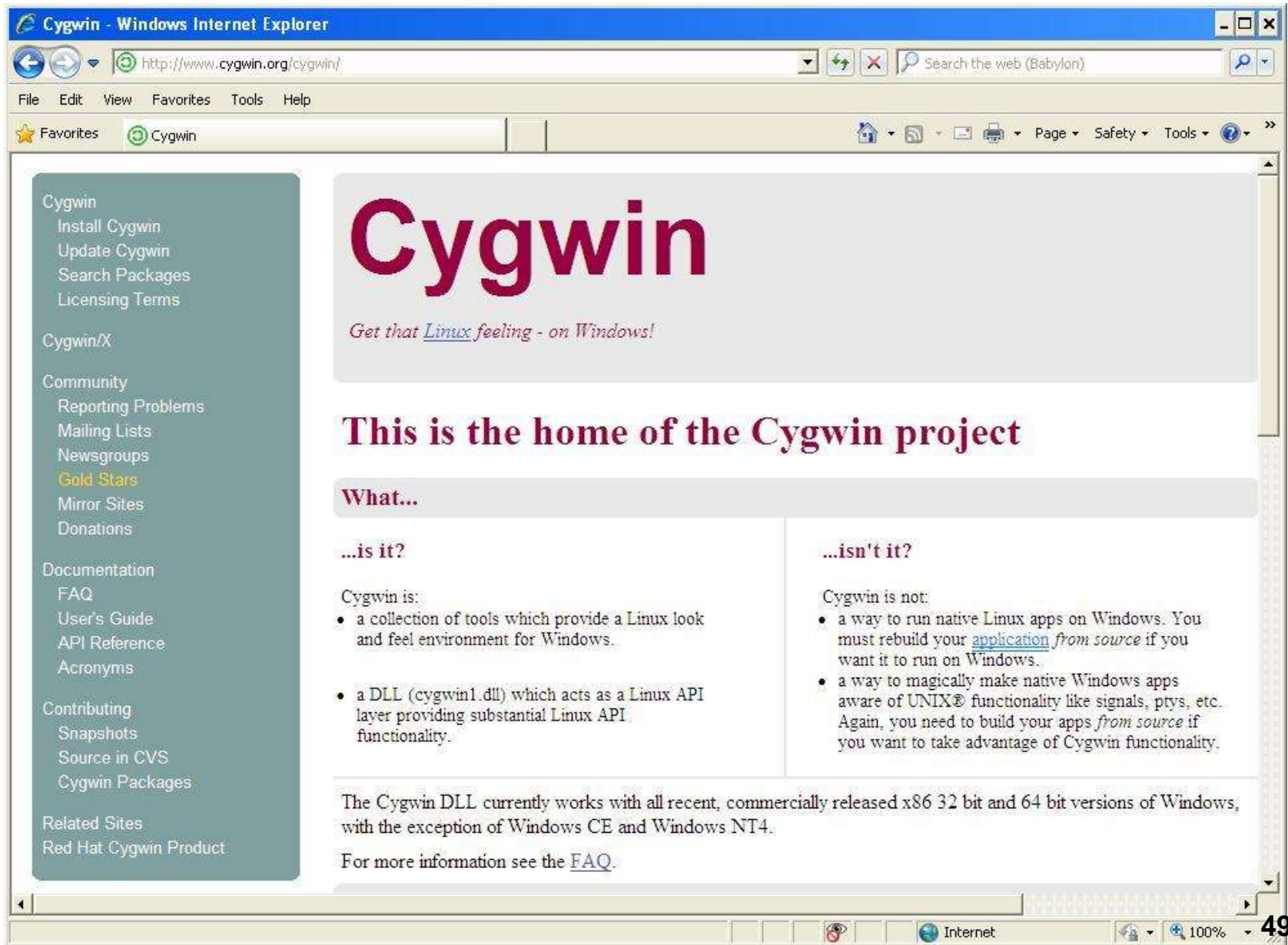
Instance ID	i-72925bd1	Public DNS	ec2-54-158-173-168.compute-1.amazonaws.com
Instance state	running	Public IP	54.158.173.168
Instance type	t1.micro	Elastic IP	-
Private DNS	ip-10-180-184-117.ec2.internal	Availability zone	us-east-1e
Private IPs	10.180.184.117	Security groups	launch-wizard-2. view rules
Secondary private IPs	-	Scheduled events	No scheduled events
VPC ID	-	AMI ID	bitnami-ocportal-9.0.19-0-linux-redhat-6.6-x86_64-ebs (ami-008db468)

- Please note: security group is “default”. Instance has a unique name: i-72925bd1, AMI ID is ami-008db468.

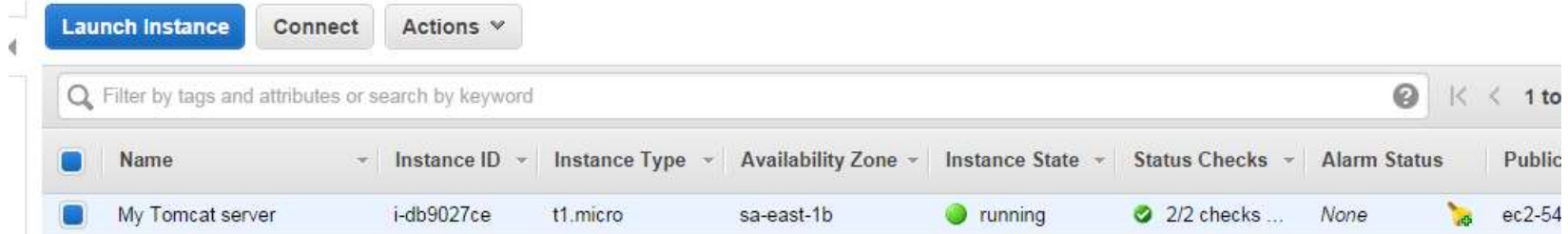
Tools to Connect With

- To connect to an instance you need a SSH (Secure Shell) tool.
- `Putty` is one of Windows tools emulating SSH protocol. When you are downloading Putty, from the same site, please, download `WinSCP` as well. `WinSCP` provides secure copy functionality on Windows.
- `CygWin` on Windows provides a complete set of Linux (Unix) utilities, including SSH.
- Linux and Unix boxes, including Apple machines, by rule have a `ssh` tool.
- OpenSSH project provides a free implementation of the full suite of SSH tools and is part of CygWin download.
- OpenSSH project is under Net group of projects. When downloading Cygwin, make sure you check (select) OpenSSH.

Download CygWIN



Select Connect on Your Instance Screen



Connect To Your Instance

I would like to connect with

- ☒ A standalone SSH client
- ☐ A Java SSH Client directly from my browser (Java required)

To access your instance:

- Open an SSH client. (find out how to [connect using PuTTY](#))
- Locate your private key file (ec2hu.pem). The wizard automatically detects the key you used to launch the instance.
- Your key must not be publicly viewable for SSH to work. Use this command if needed:

```
chmod 400 ec2hu.pem
```
- Connect to your instance using its Public DNS:

```
ec2-54-207-160-74.sa-east-1.compute.amazonaws.com
```

Example:

```
ssh -i ec2hu.pem ubuntu@ec2-54-207-160-74.sa-east-1.compute.amazonaws.com
```

Please note that in most cases the username above will be correct, however please ensure that you read your AMI usage instructions to ensure that the AMI owner has not changed the default AMI username.

If you need any assistance connecting to your instance, please see our [connection documentation](#).

Close

Select Connect next to Launch Instances button. New widget appears. Public DNS is the name of your host. Please note the user name, ubuntu in our case. We need that user name in order to connect with ssh or Putty. User name in this dialog is somewhat unreliable. Be ready to try: root, ec2-user, bitnami, others.

Connect with SSH

- In Cygwin's command line shell, change directory to the location of the key pair file that you created when you launched the instance.
- Use the `chmod` command to make sure your key pair file isn't publicly viewable.
- For example, my file is named `ec2hu.pem`. I do this first

```
$chmod 400 ec2hu.pem
```

- Connect to your instance using the instance's public DNS name (which you should have recorded or copied earlier). For example, if the key file is `ec2hu.pem`, user name `ubuntu` and the instance's DNS name:

```
ec2-54-158-173-168.compute.amazonaws.com
```

we use the following command (all on one line)

```
$ssh -i ec2hu.pem
```

```
ubuntu@ec2-54-158-173-168.compute-1.amazonaws.com
```

- **Note:** `ubuntu` is the user name or the Linux account. That user usually has `sudo` privileges, i.e. it could execute commands as if `root`.

Secure Copy with SCP

- If you want to transfer a new file to home directory of your EC2 machine, the following command will do that.

```
scp -i ec2hu.pem newfile.txt ubuntu@ec2-54-  
158-173-168.compute-1.amazonaws.com:/home/ubuntu
```

Be Positive, Say 'yes'

```
$ ssh -i ec2hu.pem ubuntu@ec2-54-158-173-168.compute-1.amazonaws.com
The authenticity of host 'ec2-54-158-173-168.compute-1.amazonaws.com (54.242.17.195)' can't be established.
ECDSA key fingerprint is
f8:bc:f7:b2:52:8e:a6:ac:a2:9f:92:7d:dd:76:3c:f9.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-54-158-173-168.compute-1.amazonaws.com,54.242.17.195' (ECDSA) to the list of known hosts.
Permission denied (publickey).
```

- Remote host (AWS box) might reject your login.
- The issue might be in the user name. Try `bitnami` or `ec2-user`

Be Positive, Say 'yes'

```
$ ssh -i ec2hu.pem bitnami@ec2-54-158-173-168.compute-1.amazonaws.com
Welcome to Ubuntu 12.04.2 LTS (GNU/Linux 3.2.0-49-virtual i686)
```

[illegible]

```
*** Welcome to the BitNami Tomcat 7.0.42-0 ***
*** BitNami Wiki:      http://wiki.bitnami.com/ ***
*** BitNami Forums:   http://answers.bitnami.com/ ***
```

To run a command as administrator (user "root"), use "sudo <command>".

See "man sudo_root" for details.

bitnami@ip-10-196-125-57:~\$

- This time, we are in, as user `bitnami`.
- The note about `sudo` command is very important. In most cases, if you do not login into the instance as `root`, you login as a user with `sudo` (super user doer??) privilege.

Bitnami.com/stacks

The screenshot shows a web browser window with the address bar displaying "bitnami.com/stacks". The browser's tab bar shows "nt Console" and "B BitNami Stacks". The browser's address bar shows "bitnami.com/stacks". The browser's toolbar shows "E-185 Big Data", "Logout", "VMware Store", "Ansamb! Svilen Kon...", "Ebook library Booko...", "Blackboard Collabor...", and "E-90 Cloud".

The BitNami website header features the "BitNami" logo in a large, bold, black font. To the right of the logo are navigation links: "APPS", "CLOUD HOSTING", "SUPPORT", and "LOGIN".

The main content area is titled "Applications" in a large, blue, serif font. Below the title is a paragraph of text: "BitNami is an app store for server software. Install your favorite applications in your own servers or run them in the cloud. Select one app to get started or [learn more](#) about what makes BitNami special." Below this text is a search bar with a magnifying glass icon.

On the left side of the page, there is a vertical sidebar with a list of categories: "All", "Popular", "Recently Updated", "Infrastructure", "Cloud Tools", "Accounting", "Analytics", "Binary Repository", "Blog", "Bug Tracking", "Bundles", "Business Intelligence", "CMS", "Code Review", "Collaboration", "Continuous Integration", "CRM", "Developer Tools", and "e-Commerce".

The main content area displays a grid of application icons. Each icon is a square with rounded corners and a shadow. Below each icon is the application name and its category. The applications shown are:

- Redmine (Bug Tracking)
- WordPress (Blog)
- WAMP Stack (Infrastructure)
- Joomla! (CMS)
- PrestaShop (e-Commerce)
- Tomcat Stack (Infrastructure)

Below the first row, there are more icons, but they are partially cut off at the bottom of the image.

Are Apache and Tomcat present?

- We can verify whether Apache server and Tomcat server are up and running by doing Unix `grep` for `httpd` (name of Apache process) and by grepping for `tomcat`.
- On our instance, both tests are positive:

```
bitnami@ip-10-196-125-57:~$ ps -ef | grep httpd
```

```
root      1212      1  0  02:31 ?           00:00:00
/opt/bitnami/apache2/bin/httpd -f /opt/bitnami/apache2/conf/httpd.conf

daemon    1244    1212  0  02:31 ?           00:00:00
/opt/bitnami/apache2/bin/httpd -f /opt/bitnami/apache2/conf/httpd.conf

daemon    1245    1212  0  02:31 ?           00:00:00
/opt/bitnami/apache2/bin/httpd -f /opt/bitnami/apache2/conf/httpd.conf
```

```
bitnami@ip-10-196-125-57:~$ ps -ef | grep tomcat
```

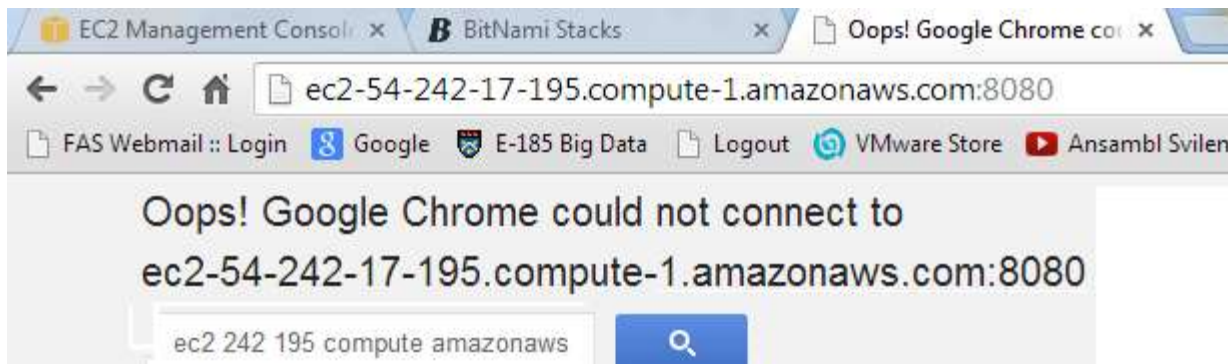
```
root      1192      1  0  02:31 ?           00:00:00 jsvc.exec -java-home
/opt/bitnami/java -user tomcat -pidfile /opt/bitnami/apache-
tomcat/temp/catalina.pid -wait 10 -outfile /opt/bitnami/apache-
tomcat/logs/catalina-daemon.out -errfile &1 -classpath
/opt/bitnami/apache-tomcat/bin/bootstrap.jar:/opt/bitnami/apache-
tomcat/bin/commons-daemon.jar:/opt/bitnami/apache-tomcat/bin/tomcat-
juli.jar -Djava.util.logging.config.file=/opt/bitnami/apache-
tomcat/conf/logging.properties -XX:MaxPermSize=512m -Xms256m -Xmx512m
```


Test the URLs

- Test at DNS name and port 80 is successful. Apache is visible.



- Test at DNS name and port 8080 is not successful. Tomcat is not visible at its default port.



Examine on which ports Linux box listens

- We can use `netstat -an` command to see where, on which ports is Linux box listening for incoming calls.

```
bitnami@ip-10-196-125-57:~$ netstat -an | grep LISTEN
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:21           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:22             0.0.0.0:*               LISTEN
tcp6       0      0 :::443                 :::*                    LISTEN
tcp6       0      0 :::8009                :::*                    LISTEN
tcp6       0      0 :::80                  :::*                    LISTEN
tcp6       0      0 :::22                  :::*                    LISTEN
unix       2      [ ACC ] STREAM    LISTENING   7203        /var/run/acpid.socket
```

- We see that port 80 is active. That must be the Apache

```
sudo vi /opt/bitnami/apache-tomcat/conf/server.xml
```

- We open the file with vi. The relevant portion of `server.xml` file turns out to be commented out:

```
<!-- A "Connector" represents an endpoint by which requests are received
      and responses are returned. Documentation at :
      Java HTTP Connector: /docs/config/http.html(blocking & non-blocking)
      Java AJP  Connector: /docs/config/ajp.html
      APR (HTTP/AJP) Connector: /docs/apr.html
      Define a non-SSL HTTP/1.1 Connector on port 8080
-->
<!--
<Connector port="8080" URIEncoding="UTF-8" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8443" />

-->
<!-- A "Connector" using the shared thread pool-->
<!--
<Connector executor="tomcatThreadPool"
           port="8080" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8443" />

-->
```

- We will remove comments around connector at 8080 and restart the Tomcat. Save changes in vi by doing: `Esc (ape) , :wq! .`

New server.xml

```
Define a non-SSL HTTP/1.1 Connector on port 8080
-->
<Connector port="8080" URIEncoding="UTF-8" protocol="HTTP/1.1"
    connectionTimeout="20000"
    redirectPort="8443" />
<!-- A "Connector" using the shared thread pool-->
<Connector executor="tomcatThreadPool"
    port="8080" protocol="HTTP/1.1"
    connectionTimeout="20000"
    redirectPort="8443" />
<!-- Define a SSL HTTP/1.1 Connector on port 8443
    This connector uses the JSSE configuration, when using APR
    the configuration should be in the tomcat6.conf file. -->
```

- For Tomcat to accept changes we either run shutdown.sh and startup.sh scripts in Tomcat's bin directory

```
..:/opt/bitnami/apache-tomcat/bin$ sudo ./shutdown.sh
```

```
..:/opt/bitnami/apache-tomcat/bin$ sudo ./startup.sh
```

- Or run ctlscript.sh in /opt/bitnami directory, as:

```
..:/opt/bitnami$ sudo ./ctlscript.sh stop tomcat
```

```
/opt/bitnami/apache-tomcat/scripts/ctl.sh : tomcat stopped
```

```
..:/opt/bitnami$ sudo ./ctlscript.sh start tomcat
```

```
/opt/bitnami/apache-tomcat/scripts/ctl.sh : tomcat started
```

```
bitnami@ip-10-196-125-57:/opt/bitnami$
```

- If we now run netstat -an | grep LISTEN again, we will see that something is listening on port 8080.

Test the URL:8080

- If we now repeat the test at:

<http://ec2-54-158-173-168.compute-1.amazonaws.com:8080/>

- We will again fail to see Tomcat's page. Something else is blocking our access to port 8080.
- We need to look at the security group, in our case “default” group. Security groups controls inbound traffic on AWS instances. If we double click on Security Groups and then check mark the default group, we will see that port 80 is open , but port 8080 is not.
- We add 8080 in the Port range filed, click + Add Rule and then, Apply Rule Change. The result with port 8080 added to the firewall is presented on the next slide.

Change Security Group, Add Port 8080

The screenshot shows the AWS Management Console interface for the 'Security Groups' page. The left sidebar contains navigation links for EC2 Dashboard, INSTANCES, IMAGES, ELASTIC BLOCK STORE, and NETWORK & SECURITY. The 'Security Groups' link is highlighted. The main content area shows a list of security groups with columns for Name, Group ID, Group Name, VPC ID, and Description. The selected security group is 'sg-7aaa0967' with the name 'default'. Below the list, the 'Security Group: sg-7aaa0967' section is visible, with tabs for Description, Inbound, and Tags. The 'Inbound' tab is active, and an 'Edit' button is located above the rules matrix.

Type	Protocol	Port Range	Source
All TCP	TCP	0 - 65535	sg-7aaa0967 (default)
All UDP	UDP	0 - 65535	sg-7aaa0967 (default)
All ICMP	All	N/A	sg-7aaa0967 (default)
SSH	TCP	22	0.0.0.0/0
HTTP	TCP	80	0.0.0.0/0

- Select Edit above the rules matrix.

Add Custom TCP Rule for port 8080

- Select Add Rule and add a custom TCP rule for port 8080
- Save Rule Change.
- Apply Rule Change actually propagates the change and makes modifications in `iptables` that control the firewall on your instance.

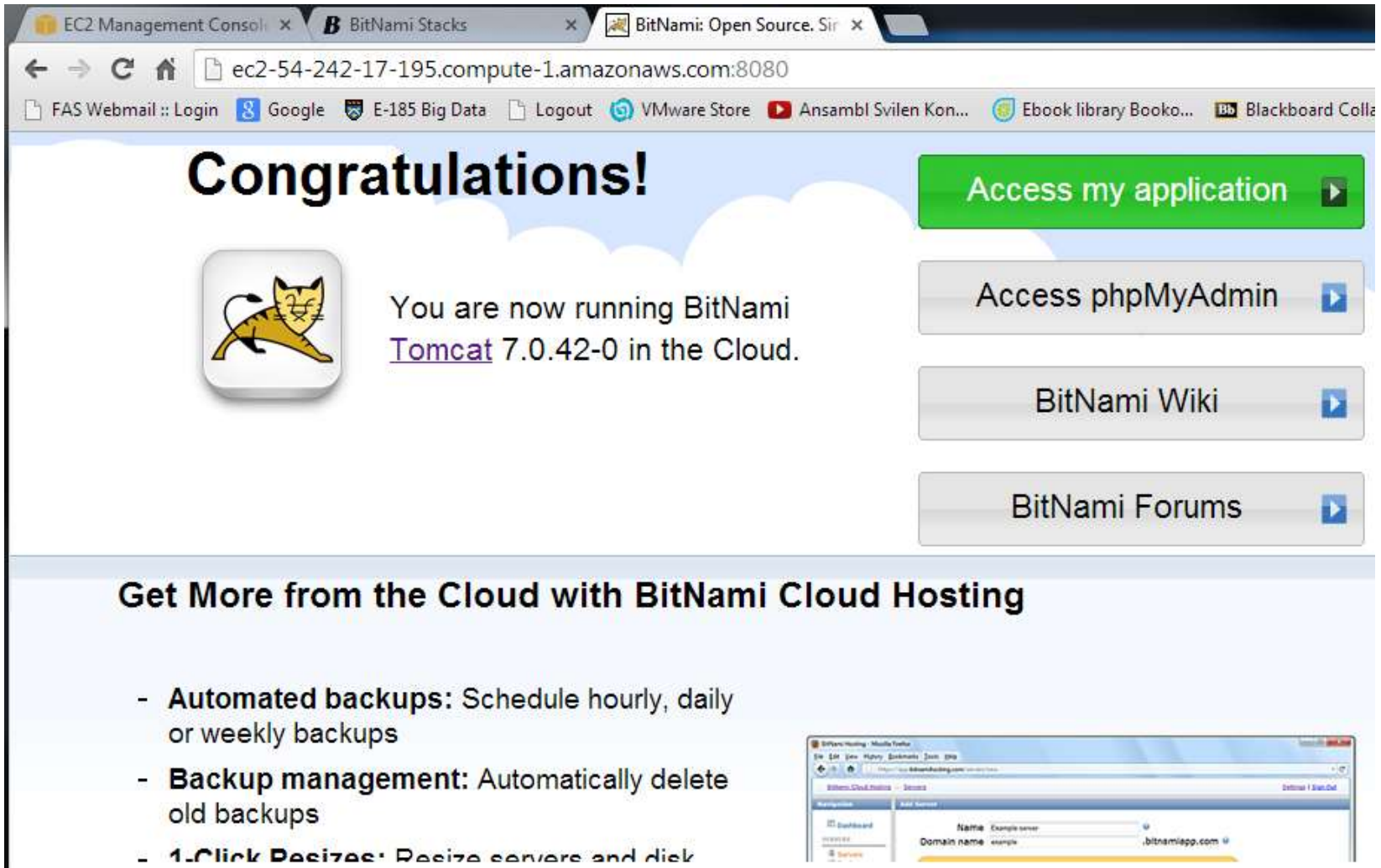
Edit inbound rules ✕

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	
All TCP ▼	TCP	0 - 65535	Custom IP ▼ sg-7aaa0967	✕
All UDP ▼	UDP	0 - 65535	Custom IP ▼ sg-7aaa0967	✕
All ICMP ▼	ICMP	0 - 65535	Custom IP ▼ sg-7aaa0967	✕
SSH ▼	TCP	22	Anywhere ▼ 0.0.0.0/0	✕
HTTP ▼	TCP	80	Anywhere ▼ 0.0.0.0/0	✕
Custom TCP Rule ▼	TCP	8080	Anywhere ▼ 0.0.0.0/0	✕

Add Rule

Cancel Save

Test Again



EC2 Management Console x BitNami Stacks x BitNami: Open Source. Sir x

ec2-54-242-17-195.compute-1.amazonaws.com:8080

FAS Webmail :: Login Google E-185 Big Data Logout VMware Store Ansamb! Svilen Kon... Ebook library Booko... Blackboard Colla

Congratulations!

You are now running BitNami Tomcat 7.0.42-0 in the Cloud.

[Access my application](#)

[Access phpMyAdmin](#)

[BitNami Wiki](#)

[BitNami Forums](#)

Get More from the Cloud with BitNami Cloud Hosting

- **Automated backups:** Schedule hourly, daily or weekly backups
- **Backup management:** Automatically delete old backups
- **1-Click Resizes:** Resize servers and disk

BitNami Cloud Hosting - Multiple Servers

Navigation: Dashboard Servers

Add Server

Name: Example server

Domain name: example .bitnamiapp.com

- Tomcat is there at port 8080 and we can declare a Victory.
- Tomcat is easy to deal with and we can start building apps in the Cloud.

Amazon S3

csci 63 Big Data Analytics
LAB 06

Brief Overview of S3

What is Amazon S3

- Amazon S3 is a simple storage service that offers software developers a highly-scalable, reliable, and low-latency data storage infrastructure at a very low cost.
- S3 can store any amount of data. Data can be stored in S3 anywhere from the Internet. AWS Storage facilities are grouped in Regions. You can choose any region that optimizes the latency, cost or address local regulations.

What could be stored in S3

- Users of S3 commonly store images, video, and other content for their websites on Amazon S3. You can host an entire static website from an Amazon S3 buckets.

How much could be stored

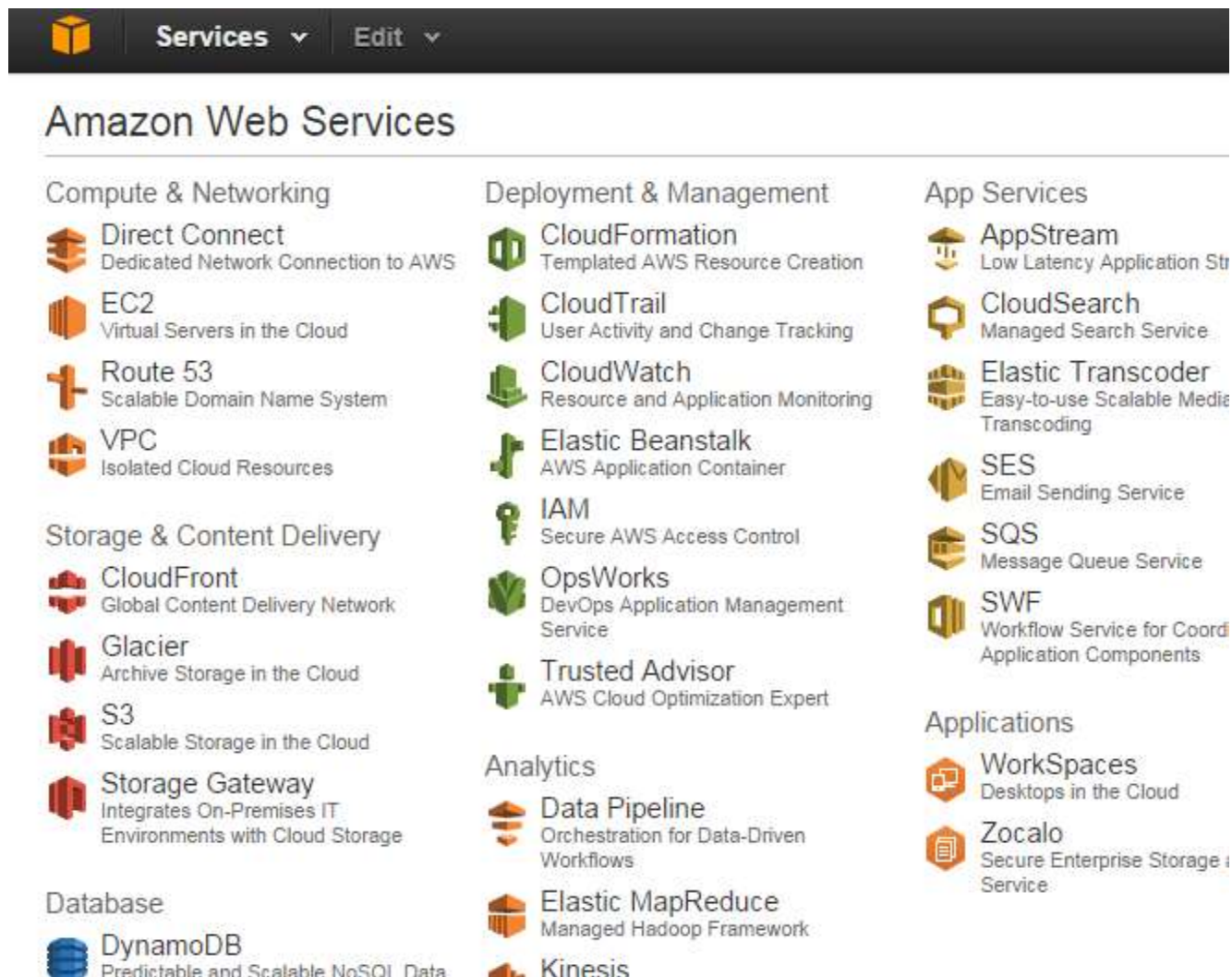
- The total volume of data and number of objects one can store are unlimited. Individual Amazon S3 objects can range in size from 1 byte to 5 terabytes. The largest object uploaded in a single PUT is 5 gigabytes.

Data Durability, Reliability, Versioning

- Amazon S3 provides a highly durable storage infrastructure.
- S3 redundantly stores data in multiple facilities and on multiple devices within each facility. Data is stored across multiple facilities before SUCCESS is returned. S3 calculates checksums on all network traffic to detect corruption of data packets when storing or retrieving data. S3 performs regular, systematic data integrity checks and is built to be automatically self-healing.
- 99.999999999% durability and 99.99% availability of objects over a given year. Designed to sustain the concurrent loss of data in two facilities.
- S3 provides further protection via Versioning. You can use Versioning to preserve, retrieve, and restore every version of every object stored in your S3 bucket. This allows easy recovery from both unintended user actions and application failures. By default, requests retrieve the most recent version. Older versions of an object can be retrieved by specifying a version in the request. Storage rates apply for every version stored.

Start using S3

- Go to aws.amazon.com
- Login into AWS Management Console
- On the Dashboard listing all AWS services select **S3**.



Storage Pricing

- Price of storing data at Amazon (S3) depends slightly on the region. USA prices are provided below.
- If one could allow reduce reliability (redundancy) of storage, price is some 20% lower.
- Glacier storage is considerably cheaper, however, getting data from Glacier storage might take hours

	Standard Storage	Reduced Redundancy Storage	Glacier Storage
First 1 TB / month	\$0.0300 per GB	\$0.0240 per GB	\$0.0100 per GB
Next 49 TB / month	\$0.0295 per GB	\$0.0236 per GB	\$0.0100 per GB
Next 450 TB / month	\$0.0290 per GB	\$0.0232 per GB	\$0.0100 per GB
Next 500 TB / month	\$0.0285 per GB	\$0.0228 per GB	\$0.0100 per GB
Next 4000 TB / month	\$0.0280 per GB	\$0.0224 per GB	\$0.0100 per GB
Over 5000 TB / month	\$0.0275 per GB	\$0.0220 per GB	\$0.0100 per GB

Data Transfer Pricing

- Data transfer "in" and "out" refers to transfer into and out of an Amazon S3 Region.

Data Transfer IN To Amazon S3

All data transfer in	\$0.000 per GB
----------------------	----------------

Data Transfer OUT From Amazon S3 To

Amazon EC2 in the Northern Virginia Region	\$0.000 per GB
Another AWS Region or Amazon CloudFront	\$0.020 per GB

Data Transfer OUT From Amazon S3 To Internet

First 1 GB / month	\$0.000 per GB
Up to 10 TB / month	\$0.120 per GB
Next 40 TB / month	\$0.090 per GB
Next 100 TB / month	\$0.070 per GB
Next 350 TB / month	\$0.050 per GB

Essential Concepts

Objects

- Objects are the fundamental entities stored in Amazon S3.
- Objects consist of object data and metadata and can range in size from 1 byte to 5 terabytes.
- The data portion is opaque to Amazon S3.
- The key is the handle that you assign to an object that allows you retrieve it later.

The metadata

- The metadata is a set of name-value pairs that describe the object.
- The developer can specify custom metadata and standard HTTP metadata, such as Content-Type.

Essential Concepts

Buckets

- You upload objects into buckets.
- There is no limit to the number of objects that you can store in a bucket.
- The bucket provides a unique namespace for the management of objects contained in the bucket. Each developer can own up to 100 buckets at a time??
- You own each bucket you create. AWS charges you for storing objects in your buckets and for transferring objects in and out of your buckets.

Bucket Namespace

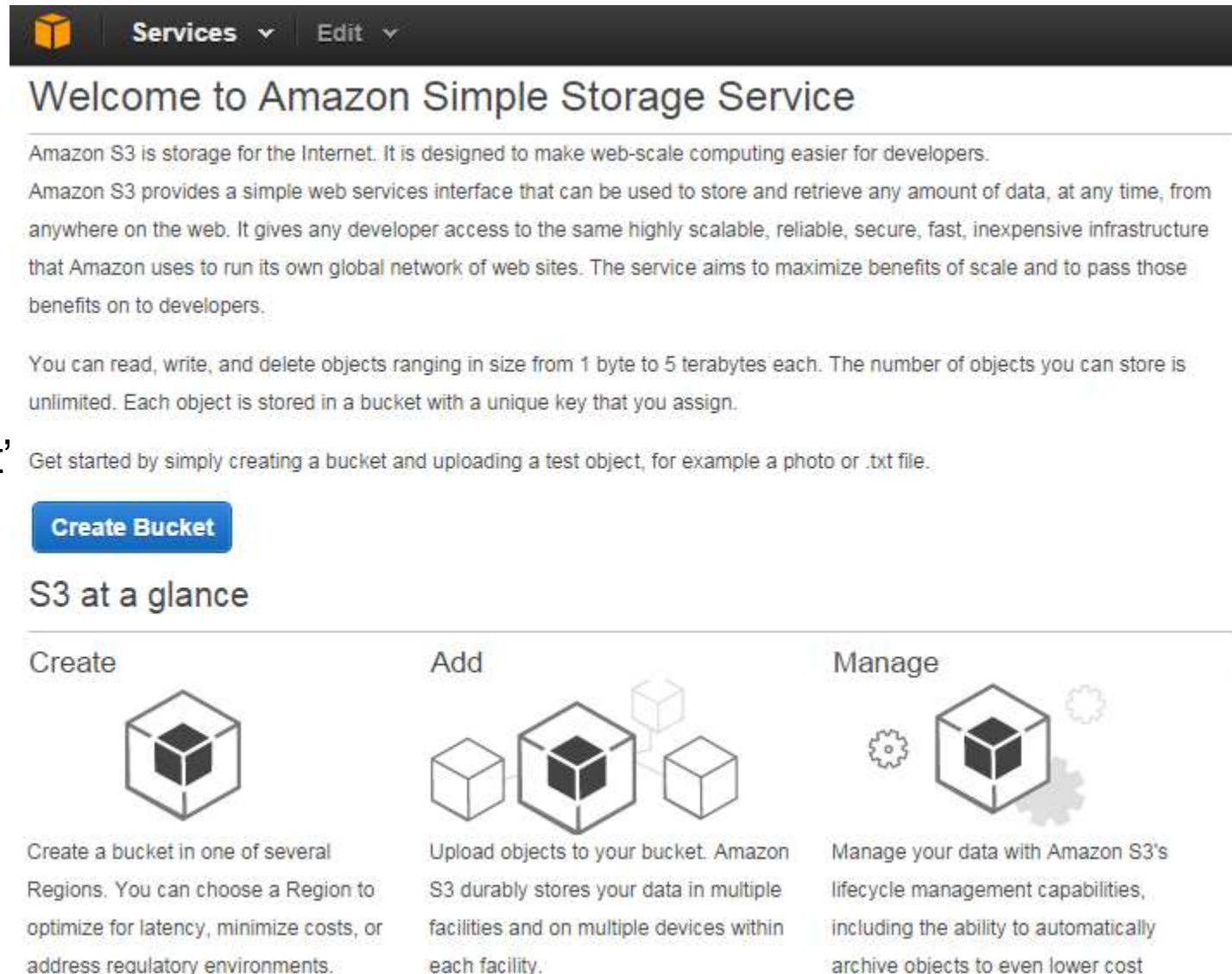
- Every object stored in Amazon S3 is contained in a bucket.
- Buckets partition the namespace of objects stored in Amazon S3 at the top level. Within a bucket, you can use any names for your objects, but bucket names must be unique across all of Amazon S3.
- Buckets are similar to Internet domain names.
- Only one person or organization can own a bucket within Amazon S3.
- The similarities between buckets and domain names is not a coincidence—there is a direct mapping between Amazon S3 buckets and subdomains of `s3.amazonaws.com`.
- Objects stored in Amazon S3 are addressable using the REST API under the domain `s3.amazonaws.com/bucketName`.
- For example, if the object `homepage.html` is stored in the Amazon S3 bucket `mybucket` its Internet address would be
- `http://s3.amazonaws.com/mybucket/homepage.html`

Naming Buckets and Locations

- Buckets should be named so that you can reference your bucket using the convention
- `s3.amazonaws.com/<bucketname>..`
- Use 3 to 63 characters.
- Use only lower case letters (at least one), numbers, '.' and '-'.
- Don't start or end the bucket name with '.' and don't follow or precede a '.' with a '-'.
- Keys can be named with any properly encoded UTF-8 character. Literal '+' characters should always be URL encoded.

Select S3 Service, Create Bucket

- On AWS Management Console select S3 service.
- On the Welcome screen, select “Create Bucket”



Welcome to Amazon Simple Storage Service

Amazon S3 is storage for the Internet. It is designed to make web-scale computing easier for developers.




Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, secure, fast, inexpensive infrastructure that Amazon uses to run its own global network of web sites. The service aims to maximize benefits of scale and to pass those benefits on to developers.

You can read, write, and delete objects ranging in size from 1 byte to 5 terabytes each. The number of objects you can store is unlimited. Each object is stored in a bucket with a unique key that you assign.

Get started by simply creating a bucket and uploading a test object, for example a photo or .txt file.

Create Bucket

S3 at a glance

Create	Add	Manage
		
Create a bucket in one of several Regions. You can choose a Region to optimize for latency, minimize costs, or address regulatory environments.	Upload objects to your bucket. Amazon S3 durably stores your data in multiple facilities and on multiple devices within each facility.	Manage your data with Amazon S3's lifecycle management capabilities, including the ability to automatically archive objects to even lower cost

Create Bucket and Region

- Bucket name must be unique across entire Amazon S3.
- Select one of 10 available regions.
- In order to enable logging, we need an existing bucket. Let us call that bucket xx.01audit. That bucket does not have logging set up.

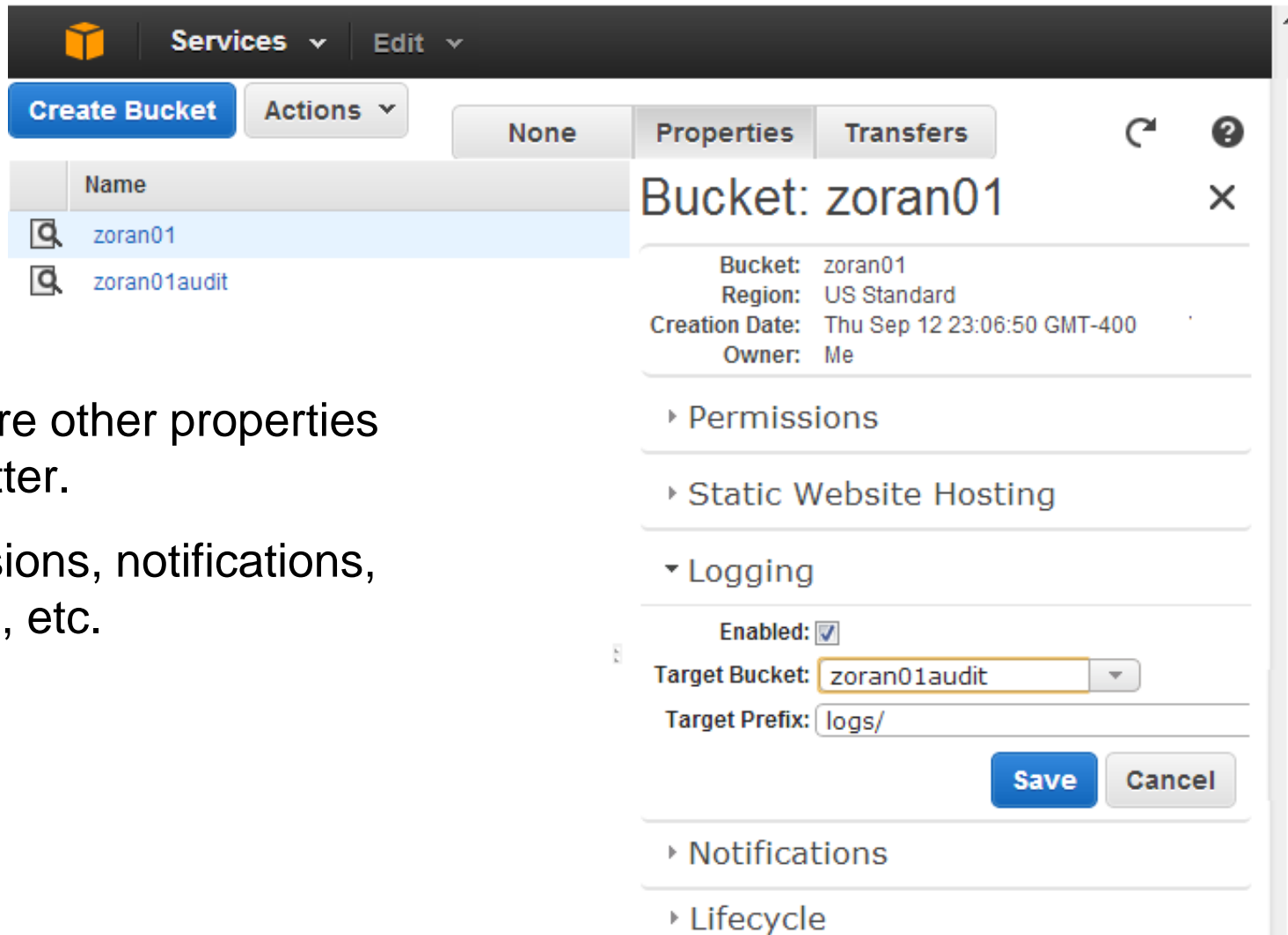
The screenshot shows the 'Create a Bucket' dialog in the AWS S3 console. The title bar reads 'Create a Bucket - Select a Bucket Name and Region' with a 'Cancel' button. Below the title bar, a text box explains: 'A bucket is a container for objects stored in Amazon S3. When creating a bucket, you can 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](#).' The 'Bucket Name' field contains 'zoran01audit'. The 'Region' dropdown menu is open, showing a list of regions: 'US Standard' (highlighted), 'Oregon', 'Northern California', 'Ireland', 'Singapore', 'Tokyo', 'Sydney', 'Sao Paulo', and 'Frankfurt'. At the bottom right, there are three buttons: 'Set Up Logging >', 'Create' (in blue), and 'Cancel'.

First Bucket is Created

The screenshot shows the Google Cloud Storage console interface. At the top, there's a navigation bar with 'Services', 'Edit', and user information 'Zoran Djordjevic'. Below this, a 'Create Bucket' button is visible. To the right of the button are tabs for 'None', 'Properties', and 'Transfers'. On the left, under 'All Buckets', a search bar shows 'zoran01audit'. The main area displays the details for the bucket 'zoran01audit'. The details include: Bucket: zoran01audit, Region: US Standard, Creation Date: Thu Sep 12 22:45:08 GMT-400, and Owner: Me. Below these details are expandable sections for Permissions, Static Website Hosting, Logging, Notifications, Lifecycle, Tags, Requester Pays, and Versioning. A description for Versioning is provided at the bottom: 'Versioning allows you to preserve, retrieve, and restore every version of every object stored in this bucket. This provides an additional level of protection by providing a means of recovery for accidental overwrites or deletions.'

- To create the second bucket we just hit Create Bucket button on this page.
- If we create new bucket with name zoran01, it will appear above the first bucket.

Modify Properties, Add Logging



The screenshot shows the AWS S3 console interface. At the top, there's a navigation bar with 'Services' and 'Edit' dropdowns. Below it, a 'Create Bucket' button and an 'Actions' dropdown are visible. A list of buckets is shown on the left, with 'zoran01' and 'zoran01audit' listed. The 'Properties' tab is selected for the bucket 'zoran01'. The 'Logging' section is expanded, showing the following configuration:

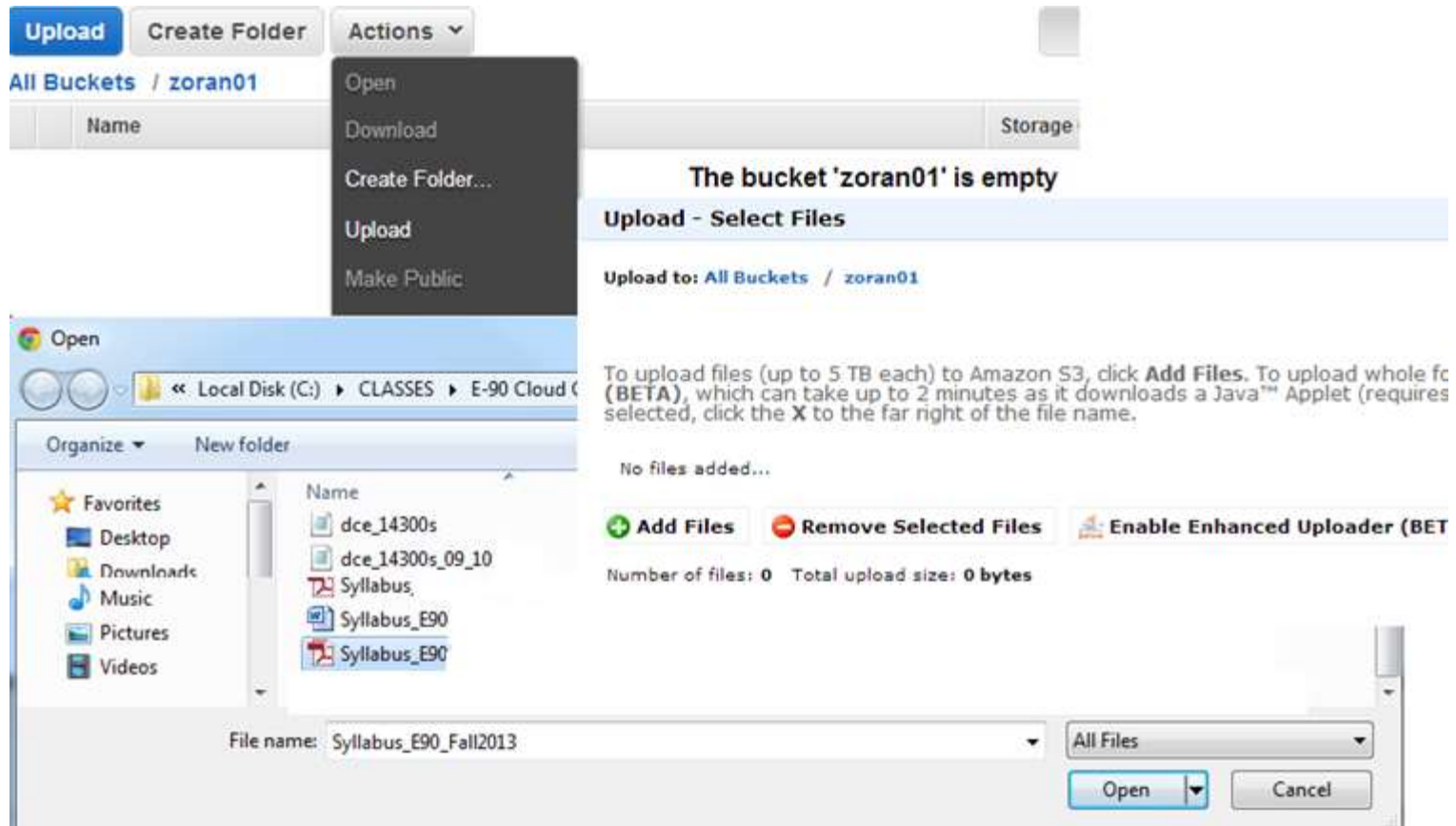
- Enabled: ☒
- Target Bucket: zoran01audit
- Target Prefix: logs/

Buttons for 'Save' and 'Cancel' are at the bottom right of the logging section. Other sections like 'Permissions', 'Static Website Hosting', 'Notifications', and 'Lifecycle' are also visible but not expanded.

- There are other properties that matter.
- Permissions, notifications, lifecycle, etc.

Upload a File, Any HTML or PDF file

- From Actions menu select **Upload**, on the new widget, select **Add Files**
- Your file(s), if not too big is(are) up in the bucket right away.



Try to Locate the file from a Browser

- Our file should be reachable at:

http://s3.amazonaws.com/zoran01/Syllabus_E90.pdf

- Open another browser (Mozilla) and try. We get back:

```
<Error>
```

```
<Code>AccessDenied</Code>
```

```
<Message>Access Denied</Message>
```

```
<RequestId>2B289BE6F7282D14</RequestId>
```

```
<HostId>v62x3+gRzISTfCZuK1Q2XqMLpblrgDa31YGseWgq0VCC2uk5bBVCWP4T
```

```
</HostId>
```

```
</Error>
```

The issue is in permissions, most probably.

- To change permissions on the specific object in your bucket, highlight the object, select **Properties** in the top menu, then expand **Permissions**, and select **Add more permissions**.