AWS Account Setup and Services Overview

1. Purpose of the Lab

Understand definitions of various Amazon Web Services (AWS) and their use in cloud computing based web applications that are accessible over the Internet through an AWS account.

2. Lab Steps and output collection guidelines





Figure 1 shows the steps required to successfully create an account credited with funds for using AWS. You will need to understand pricing conditions and services documentation related with 'AWS free usage tier', understand AWS Architecture, create your 'AWS account' and join it to the 4001/7001 Cloud Computing course in order to be granted with \$100 credit. You will launch your first AWS EC2 (Elastic Compute Cloud) instance. Finally, you will use AWS CloudWatch to add a Bill alarm for monitoring and managing your credit.

Let's get started!

3.1 Amazon Web Services

Take your time in order to understand the conditions of free usage that involve free account availability, restrictions in terms of instance types, pay-as-you-go service rates, operating systems that are under the free usage condition, and free usage accumulation, detailed information can be found on <u>http://aws.amazon.com/free/</u>.

AWS Free Tier (Per Month):

Elastic Compute Cloud (EC2)

- 750 hours of Amazon EC2 Linux t.2 micro instance usage (1 GiB
 1,000 Amazon SWF workflow executions and a total of 10,000 of memory and 32-bit and 64-bit platform support) - enough hours to run continuously each month*
- 750 hours of Amazon EC2 Microsoft Windows Server† t.2 micro instance usage (1 GiB of memory and 32-bit and 64-bit platform support) - enough hours to run continuously each month*
- 750 hours of an Elastic Load Balancer plus 15 GB data processing*
- 30 GB of Amazon Elastic Block Storage in any combination of General Purpose (SSD) or Magnetic, plus 2 million I/Os (with EBS Magnetic) and 1 GB of snapshot storage*

Simple Storage Service (S3)

 5 GB of Amazon S3 standard storage, 20,000 Get Requests, and 2,000 Put Requests*

DynamoDB

25 GB of Storage, 25 Units of Read Capacity and 25 Units of Write Capacity - Enough to handle up to 200M requests per month with Amazon DynamoDB.**

Relational Database Service (RDS)

- 750 hours of Amazon RDS Single-AZ Micro DB Instances, for running MySQL, PostgreSQL, Oracle BYOL or SQL Server (running SQL Server Express Edition) – enough hours to run a DB Instance continuously each month*
- 20 GB of database storage, in any combination of RDS General Purpose (SSD) or Magnetic storage
- 10 million I/Os (for use with RDS Magnetic storage; I/Os on RDS General Purpose (SSD) storage are not separately billed)
- 20 GB of backup storage for your automated database backups and any user-initiated DB Snapshots

Simple Workflow (SWF)

activity tasks, signals, timers and markers, and 30,000 workflow-days.**

Simple Queue Service (SQS) and Simple Notification Service (SNS)

- 1.000.000 Requests of Amazon Simple Queue Service**
- 1,000,000 Requests, 100,000 HTTP notifications and 1,000 email notifications for Amazon Simple Notification Service

Amazon Elastic Transcoder

 20 minutes of SD transcoding or 10 minutes of HD transcoding**

CloudWatch

 10 Amazon Cloudwatch metrics, 10 alarms, and 1.000.000 API requests**

Data Transfer

15 GB of bandwidth out aggregated across all AWS services*

Data Pipeline

- 3 low frequency preconditions running on AWS per month*
- 5 low frequency activities running on AWS per month*

ElastiCache

• 750 hours of Amazon ElastiCache - enough hours to run a Cache Node continuously each month.*

Amazon Mobile Analytics

100 million free events per month**

Go through the http://aws.amazon.com/documentation/ to find detailed information of each service that AWS provides. Pay special attention to the service groups: Getting started with AWS, Compute, Storage & Content Delivery and Database.

3.2. AWS Architecture Center

You will need to understand overall http://aws.amazon.com/architecture/ to help you build your application architecture customized according to your requirements, and for maximizing the AWS services usage. Web application hosting related customization example is shown below in Figure 1.



Figure 1: Example application customization of AWS architecture

3.3. AWS Account Creation

Create an (AWS) Amazon Web Service account in <u>http://aws.amazon.com</u> by clicking the button 'Create a Free Account' and follow the instructions. A credit/debit card and a cellphone/Landline number is required.



New AWS Accounts Include:

12 months of access to the AWS Free Tier

Amazon EC2: 750 hrs/month of Windows and Linux t2.micro instance usage Amazon S3: 5GBs of Storage Amazon RDS: 750 hrs/month of Micro DB Instance usage Amazon DynamoDB: 25 GB of storage, up to 200 million requests/month

AWS Basic Support Features

Customer Service: 24x7x365 Support Forums Documentation, White Papers, and Best Practice Guides

Visit aws.amazon.com/free for full offer terms.

- Follow the instruction to create your account. At some point you will also need to enter your credit/debit card information.
- Don't forget to select 'Basic (Free)' Support plan to access to AWS free services.

All o	ustomers receive free support. Choosing a paid support plan will allow you to receive one-on-one technical assistance n experienced engineers and access many other support features. Click here to compare all Support plans.
0	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.
0	Developer (\$49/month)
	Get started on AWS - ask technical questions and get a response to your web case within 12 hours during loca business hours.
0	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 Trusted Advisor to increase performance, fault tolerance, security, and potentially save money. (What's this 🕑)
0	Enterprise (Starting at \$15,000/month - Pricing example 🗵)
	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

• Once you create your account you will see all AWS services available for you.



3.4. Add AWS Education Credit for \$100 to your Account.

• Click on your user name and Access to 'My Account' option to see your AWS Account Id.



• As an instructor, you will have to apply for AWS education credits for your course. Goto: http://aws.amazon.com/grants/

• The application process is simple and quick

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Amazon Web Services	Application Form	
	And he as \$400 Bernet Continue	
Ant of Discourse Charles.		
	. Ford Named	
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You will receive an email within several minutes. You could have the credits set up for your AWS account and or you to manage access for students, or you could have your students set up their own AWS accounts separately. If you choose to have students set up separate accounts, you will receive individual credit codes for each user.

If you choose to manage **centrally** in your account, you can use the AWS **Identity and Access Management** feature: <u>http://aws.amazon.com/iam</u>.

• You can then assign each student their \$100 credit for the course.

AWS 🗸	Services - Edit -			Ronny Bazan 👻
Dashboard	 Account Sett 	ings	Edit 🛂	
Bills Cost Explorer Payment Methods Payment History	Account Id: Account Name: Password:	22631 Ronny Bazan		
Consolidated Billing		mation	Edit	
Account Settings Reports Preferences Credits	Name: Address: City: State: Postal Code: Country:	Ronny Columbia Missouri US		
Tax Settings DevPay	Phone Number: Company Name: Website URL:			

- When your student receives their Promo Code from you, they select 'Credits' in the menu located in the left side, enter your code and press 'Redeem' button, they will see the message with \$100 credit confirmed.
- They will be able to see their detailed usage and Credits Balance by accessing 'Bills' option in the menu.

Dashboard	Bills		8
Bills	ate: January 2015	ownload CSV	Print
Cost Explorer		Milloud Ool	91111
Payment Methods	Summary	Amou	unt
Payment History			
Consolidated	AWS Service Charges		\$0.00
Account Sottings	There are no invoices for the selected month.		
Account Settings			
Reports		+ E)	xpand All
Preferences			
Credits	Details	Tota	al
Tax Settings	AWS Service Charges		\$0.00
bon ay	▶ SimpleDB		\$0.00
	► CT to be collected		\$0.00
	▶ GST to be collected		\$0.00
	▶ US Sales Tax to be collected		\$0.00
	► VAT to be collected		\$0.00

• Another useful option is to enable 'Receive PDF Invoice my Email' as well 'Receive Billing Alerts' to keep track of the usage.

Dashboard	Preferences				
Cost Explorer	Receive PDF Invoice By Email				
Payment Methods	Turn on this feature to receive a PDF version of your invoice by email. Invoices are generally available within the first three days of the month.				
Payment History					
Consolidated Billing	Receive Billing Alerts Turn on this feature to monitor your AWS usage charges and recurring fees automatically, making it easier to track and manage your spending on AWS. You can set up billing alerts to receive email notifications when your charges reach a specified threshold. Once enabled, this preference cannot be disabled. Manage Billing Alerts				
Account Settings					
Reports					
Preferences					
Credits	Receive Billing Reports				
Tax Settings	Turn on this feature to receive ongoing reports of your AWS charges once or more daily. AWS				
DevPay	delivers these reports to the Amazon S3 bucket that you specify where indicated below. For consolidated billing customers, AWS generates reports only for paying accounts. Linked accounts cannot sign up for billing reports.				
	Save to S3 Bucket: bucket name Verify				

3.5 Launching your first AWS Instance



Figure 3: Overview of an AWS Instance

Figure 3 shows the instance architecture to be configured in this Lab. Using your AWS account, you will launch a virtual instance created in a new 'Volume' from an Amazon EBS-backed instance snapshot (called 'Root'), in order to access your reserved infrastructure resources over the Internet; you will need to create key pairs and secure it through a security group; all the infrastructure will be created in a specific zone.

3.5.1 Click 'Console Home', make sure to select the US East (N. Virginia) region in the top-right part of your screen and select AWS EC2 service (Elastic Compute Cloud).



3.5.2 In left menu select "Key Pairs".



• Create a KeyPair called 'key-ec2' and store it in a safe location, you will need this key for the future labs.

	C	
Key pair name:	key-ec2	

3.5.3 Select "Security Groups" from the left menu, name a Security Group 'SG_EC2', add description and a SSH rule with 'anywhere' option selected in source field.



• Example of Security Group creation.

reate Secu	rity Grou	p			>
Security group	name (j)	SG_EC2			
Desci	ription (j)	SSH			
	VPC (j)	vpc-2a28444f (172.31.0.0/16) * * denotes default VPC	•		
ecurity group rul Inbound Ou Type (j)	les: Itbound	Protocol (j)	Port Range (i)	Source (i)	
Inbound Ou Type () SSH	les: utbound	Protocol (j)	Port Range (j)	Source (i) Anywhere - 0.0.0/0	8

3.5.4 Launch your Instance

• In left menu, launch a new instance in the 'Instances' option Click on the 'Launch Instance' button and select the first 'Amazon Linux AMI 2014.09.1 (PV)' on the list (This AMI is not the first in the list).



• Select the first instance that is 'Free'.

1. Cho	oose AMI	2. Choose In	stance Type	3. Co	nfigure Instance	4. Add Storage	5. Tag Instance 6. C	Configure Security Group	7. Review
Step Amazon have va your ap Filter	n EC2 prov arying com pplications. by: All	OOSE AI des a wide s binations of o Learn more	selection of ir CPU, memory about instar	ce T Instance y, storag nce type All ge	types optimized f ge, and networkin as and how they of enerations	to fit different use ng capacity, and g can meet your co Show/Hide Co	cases. Instances are v jive you the flexibility to mputing needs.	irtual servers that can ru choose the appropriate	in applications. They mix of resources for
Curr	Currently selected: t1.micro (Variable ECUs, 1 vCPUs, 0.613 GiB memory, EBS only)								
	Fa	mily	- Туре	• •	vCPUs (i) -	Memory (GiB)	(GB) (i)	EBS-Optimized Available (i)	Network Performance (i)
	Micro	instances	t1.mi Free tier (cro eligible	1	0.613	EBS only	-	Very Low

• Configure the instance similar to the following diagram

1. Choose AMI	2. Choose Instance Type	3. (Configure Instance	4. Add Storage	5. Tag Instance	6. Cor	figure Security Group
Step 3: Co configure the inst dvantage of the	Infigure Instant tance to suit your require lower pricing, assign an	ce C ements acces	Details . You can launch n s management role	nultiple instances to the instance,	from the same AM and more.	ll, reque	est Spot Instances to ta
1	Number of instances	()	1				
	Purchasing option	(i)	Request Spo	t Instances			
	Network	(1)	vpc-2a28444f ((172.31.0.0/16) (default)	- 0	Create new VPC
	Subnet	(i)	No preference	(default subnet ir	any Availability Z	or 🕶	Create new subne
A	uto-assign Public IP	(1)	Use subnet set	ting (Enable)		•	
	IAM role	()	None			•	
	Shutdown behavior	(i)	Stop			•	
Enable ter	rmination protection	(1)	Protect again	nst accidental terr	mination		
	Monitoring	()	Enable Cloue Additional charg	dWatch detailed r ges apply.	nonitoring		
	Tenancy	(j)	Shared tenance Additional charge	y (multi-tenant ha	rdware) dedicated tenancy.	•	

- Keep default values in the next configuration windows and continue.
- In Tag Instance option, add 'Key' and 'Value' and shown in figure below and click on 'Next: Configure Security Group'.

1. Choose AMI	2. Choose Instance Type	3. Configure Instance	4. Add Storage	5. Tag Instance	6. Configure Security Group	
Step 5: Ta A tag consists of about tagging yo	g Instance a case-sensitive key-value ur Amazon EC2 resources	e pair. For example, you	could define a ta	g with key = Name	and value = Webserver. Learn mo	ore
Key (127 ch	aracters maximum)		Value (28	55 characters maxi	imum)	
Server Name			Web Server			⊗
Create Tag	(Up to 10 tags maximur	n)				

• Select the Security Group created previously and click on 'Review and Launch'.

1. Choose AMI	2. Choose Instance Type	3. Configure Instance	4. Add Storage	5. Tag Instance	6. Configure Security Group	7. Review
Step 6: C A security group instance. For ex the HTTP and F groups.	onfigure Security o is a set of firewall rules that cample, if you want to set up ITTPS ports. You can create	r Group control the traffic for y a web server and allow a new security group of	vour instance. On v Internet traffic to or select from an	this page, you ca b reach your instar existing one below	n add rules to allow specific to nce, add rules that allow unre r. Learn more about Amazon	raffic to reach your stricted access to EC2 security
	Assign a security grou	p: OCreate a new s	security group			
		Select an exist	i ng security grou	ıp		
					Filter VP	C security groups 👻
Securi	ty Group ID	Name	Descrip	tion		Actions
sg-84dd	179eb	default	default \	PC security group	1	Copy to new
sg-0dco	0c69	SG_EC2	SSH			Copy to new

(Lab adapted from Dr. Prasad Calyam & Ronny Bazan Antequera)

• Once you click 'launch' you will be prompted to choose the key pair 'key-ec2' created previously.

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. Choose an existing key pair
Select a key pair
Key-ec2 ▼ I acknowledge that I have access to the selected private key file (key-ec2.pem), and that without this file, I won't be able to log into my instance.
Cancel Launch Instances

• In a short time your new instance will be deployed and ready to be used.

Instance ID Instance	Type 👻 Availability Zone 🗸	Instance State 👻	Status Checks	Alarm Status	Public DNS
i-db9eb337 t2.micro	us-east-1c	🥚 terminated		None 🍡	
i-ead7db14 t1.micro	us-east-1a	running	2/2 checks …	None 🍡	ec2-54-159-18
Instance: i-ead7db14 Pu	" blic DNS: ec2-54-159-183-6.	ooo compute-1.amazon	aws.com		
Description Status Check	s Monitoring Tags				
Instance I	D i-ead7db14		Public DNS	ec2-54-159-183-6.co 1.amazonaws.com	ompute-
Instance stat	e running		Public IP	54.159.183.6	
Instance typ	e t1.micro		Elastic IP	-	
Private DN	s ip-10-28-32-78.ec2.internal	4	Availability zone	us-east-1a	
Private IF	s 10.28.32.78		Security groups	SG_EC2 view rule	S
Secondary private IF	s -	Se	cheduled events	No scheduled event	s
VPC I	D -		AMI ID	amzn-ami- pv-2014.09.1.x86_64 (ami-246ed34c)	l-ebs

3.6 Add a Bill Alarm

• Click on 'My Account' located in the top right corner of your screen.



• In 'Account Settings' find 'IAM User Access to Billing inform', Activate IAM Access and click on update button.

▼IAM User Access to Billing Inform					
IAM user access to Billing information enables IAM users with appropriate permissions configured to access Billing pages, such as Account Settings, Payment Methods and Report pages. When activated, if you want to limit access to billing pages for IAM users that currently have full access permissions configured, you must update their policies to restrict their access. Please see Controlling Access to Your Billing Information for more details.					
Activate IAM Access					
Update Cancel					

• In Console Home, select 'CloudWatch' service and make sure that 'N.Virginia' zone is selected.



• You will find a panel in the left side of your screen, click on 'Billing Alarms'



• After clicking on 'Create Alarm', input \$10 in exceed field and select your e-mail address. Take a screenshot with your name and e-mail address visible for grading purpose.

Create Alarm				
Billing Alarm	Alarm Preview This alarm will trigger when the blue line goes above the red line EstimatedCharges > 10			
You can create a billing alarm to receive e-mail alerts when your AWS charges exceed a threshold you choose. Simply:				
1. Enter a spending threshold 2. Provide an email address				
3. Check your inbox for a confirmation email and click the link provided When my total AWS charges for the month exceed: \$ 10 USD send a notification to: NotifyMe NotifyMe New list (domain_@hotmail.com)	12.5 10 7.5 5 2.5 0 12/29 12/31 1/02 00:00 00:00 00:00			
Reminder: for each address you add, you will receive an email from AWS with the	More resources			
subject "AWS Notification - Subscription Confirmation", Click the link provided in the message to confirm that AWS may deliver alerts to that address. showing simple options show advanced	AWS Billing console Getting started with billing alarms More help with billing alarms			
	AWS Billing FAQs			

• A message will be displayed after you have successfully setup your alarm.



Note: You should turn off any instances after each session – otherwise this can deplete the credits and start charging your credit card

Stop your instance.

In your AWS EC2 service select 'Instances' under 'INSTANCES' option, select your running instance, click on 'Actions' button and 'Stop' option.

Launch Instance	Connect	Actions *	_		Ð	÷	¢	8
Q Filter by tags and	attributes or sea	Connect Get Windows Password		0	< < 1 to 1 of	F 1	>	>
Name -	Instance ID	Launch More Like This		ability Zone 👻	Instance State -	5	tatu	s Che
	i 03c2037f	Instance State		Terminate			b 2/	2 chor
	1-93009371	Instance Settings	۲I	Reboot	- running		21.	z chec
		Image	۲	Stop				
		Networking	١	Start				
		CloudWatch Monitoring	١					

3.7 Manage AWS resources from your mobile device

Through a free Amazon application for smartphones (AWS Console App) you can manage your services and instances and check your billing alarms.



What to turn in for Grading?

(Report with answers to below questions should be turned in at the beginning of the class on the due date; don't forget to write your name and title (e.g., Lab X) on the reports)

Note: See first part of Step 3.4 (email screenshot of account setup to <u>TA's email</u>). Once you get e-mail from the TA, with your \$100 AWS promotion code, please add that to your account and send acknowledgement back to TA.

1. Provide screenshot of your billing alarm setup as described in Step 3.6.

2. List the 4 AWS services for each of the following categories: Database, Storage & CDN, Cross-Service, Analytics, Compute & Networking, Deployment & Management and App services.

3. Explain the objective of any 8 AWS services.

4. List the specification for the free instance used in this lab (Family, vCPUs, Memory, Storage and Network Performance)

5. Which other storage options are available besides 'Magnetic'?

6. According to 'Amazon Content and Media Service Architecture' why do IT enterprises need to use AWS to handle 'spiky' hour demands?

7. Some AWS services have been built with fault tolerance and high availability in mind. Referring to the AWS Architecture documentation, list the services that are inherently fault tolerant and provide high availability. What other services do not inherently provide these benefits, and how does one add these capabilities within those services?

8. Describe the necessity of 'Amazon Machine Image (AMI)' and 'security group' customization in 'Web Application Hosting' as described in the AWS Architecture documentation.