Amazon Web Services

Data at Scale

Why

- We should learn about AWS
 - Example for Cloud Computing
 - Reasonably cheap
 - Most covered in the free tier

How

- You need to use a credit / debit card
 - But most activities are covered by the free tier
 - Set up billing alerts (Use US North Virginia!)
 - You can work in groups

What

- AWS is a confusing conglomerates of different services
- Most prominent
 - EC2 virtual machines
 - S3 Storage capacity
- We will also use a Hadoop cluster to do exercises with Pig
 - Those can cost a bit of money if you forget to take down your cluster when you are done
 - If you make a mistake, the costs are less than 10\$ per day

Use cases for AWS

- Machine learning
 - A specialized machine with large GPU costs several thousands dollar
 - If you don't do a lot of neural network computation, AWS is cheaper
- Setting up and hosting a web server
- Running a Hadoop cluster without the hazzle
- Running Apps in a private network
- Running highly available systems
- Lowering costs for compute infrastructures

• ...

Alternatives to AWS

- Azure Virtual Machines
- Google Compute Engines & Google Cloud Storage

Billing

- AWS (and other cloud service providers) bill:
 - Per second
 - Per GB stores
 - Per GB moved

Interacting with AWS

- By hand:
 - Use the AWS management console
- Using a command-line interface
 - Allows to automize the renting of AWS resources
- SDK
 - Programmatic access
 - Available in various languages
- Blueprints
 - Description of your system
 - Compares with current state and figures out how to get additional resources

Signing up with AWS

- Provide login credentials (including strong password)
- Provide contact information
 - Your phone number is checked
- Provide payment details
- Verification of identity via phone
- Support plan



- Use your web-browser to access <u>aws.amazon.com</u>
- Create a Free Account
- Use a strong password (at least 20 characters)



Sign In or Create an AWS Account What is your email (phone for mobile accounts)? E-mail or mobile number: JamanawuaerUmydomain.com	
 I are a neturning user and my password is: 	AWS Accounts Include 12 Months of Free Tier Access
Nigh in soling our secure server	Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB
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• Create payment information

web services			Amazon	Web Services Si
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- Verify Identity
 - Message through smart-phone ...



• Choose your support plan

• BASIC

 unless you want to pay for something you'll probably do not need

- Now you can sign on to AWS
 - Go to the AWS management console

	⊜ console.aws.amazon.com	
WS Services - Resource Group	os ≁ 🔹	🗘 tbobsj 🕶 N. Virginia 🛩 Support 👻
MM/S Managor	mont Concolo	
AWS Manager	Herit Console	
AWS services		Access resources on the go
Find Services		Access the Management Console using the
You can enter names, keywords or acronyms.		AWS Console Mobile App. Learn more 🖸
Q Example: Relational Database Ser	vice, database, RDS	
All services		Explore AWS
Compute	🛞 Machine Learning	
EC2	Amazon SageMaker	Amazon RDS
Lightsail 🔼	Amazon Comprehend	Set up, operate, and scale your relational database
ECR	AWS DeepLens	in the cloud. Learn more
ECS	Amazon Lex	
EKS	Machine Learning	
Lambda	Amazon Polly	Run Serverless Containers with AWS Fargate
Batch	Rekognition	AWS Fargate runs and scales your containers
Elastic Beanstalk	Amazon Transcribe	without having to manage servers or
Serverless Application Reposit	-	clusters. Learn more 🖸
	Amazon Personalize	
🖹 Storage	Amazon Forecast Amazon Textract	
53	Amazon rextract	Visit AWS around the world at a Summit
EFS		AWS Global Summits bring the cloud computing
FSx	Analytics	community together to connect, collaborate, and
S3 Glacier	Athena	learn about AWS. Learn more 🖸
Storage Gateway	EMR	
AWS Backup	CloudSearch	AWC Marketalaco
	Elasticsearch Service	AWS Marketplace
🗮 Database	Kinesis	Find, buy, and deploy popular software products
RDS	QuickSight 🗹	that run on AWS. Learn more 🔀
DynamoDB	Data Pipeline	
ElastiCache	AWS Glue	
Neptune	MSK	Have feedback?

Select the N.Virginia service center

ACTIVITY Console.aws.amazon.com Services Resource Groups AWS Management Console

AWS services

Find Services You can enter names, keywords or acronyms.

Q Example: Relational Database Service, database, RDS

All services

ElastiCache

Neptune

	Compute	\$9	Machine Learning
	EC2		Amazon SageMaker
	Lightsail 🖸		Amazon Comprehend
	ECR		AWS DeepLens
	ECS		Amazon Lex
	EKS		Machine Learning
	Lambda		Amazon Polly
	Batch		Rekognition
	Elastic Beanstalk		Amazon Transcribe
	Serverless Application Repository		Amazon Translate
			Amazon Personalize
P	Storage		Amazon Forecast
_	53		Amazon Textract
	EFS		
	FSx	~	Analytics
	S3 Glacier		Athena
	Storage Gateway		EMR
	AWS Backup		CloudSearch
			Elasticsearch Service
E	Database		Kinesis
_	RDS		QuickSight 🗹
	DynamoDB		Data Pipeline
	ElastiCache		AWS Glue

MSK

Access resources on the go

Access the Management Console using the AWS Console Mobile App. Learn more

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Support

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Explore AWS

Amazon RDS

Set up, operate, and scale your relational database in the cloud. Learn more

Run Serverless Containers with AWS Fargate

AWS Fargate runs and scales your containers without having to manage servers or clusters. Learn more 🔀

Visit AWS around the world at a Summit

AWS Global Summits bring the cloud computing community together to connect, collaborate, and learn about AWS. Learn more 🔀

AWS Marketplace

Find, buy, and deploy popular software products that run on AWS. Learn more

Have feedback?

 Select Cost Explorer in Services

• •	_		console.aws.amazon.com C	0 1 - +
	aw	/S Services -> Resource Groups ->	٠	tbobsj 🕶 Global 👻 Support 🕶
ß	AWS	S Cost Explorer		@ -
		April costs	Forecasted April costs 🛗 March tre	ends 0
Q 		\$7.94 0% Over last month	\$7.94 0% Over last month	
		Daily unblended costs (\$) 0	Explore costs	
8		Mar-14 \$ 0.00 6 4 2 0 Mar-01* Mar-04* Mar-07* Mar-10* Mar-13* Mar- Recently accessed reports	16* Mar-19* Mar-22* Mar-25* Mar-28* Mar-31*	View all reports
		You have not accessed any reports recently from th	s device. To view all of your reports, visit the <u>report library</u> .	

- Accessing AWS
 - MacOS and Linux: use SSH
- Access is via public private key authentication
 - The public key is uploaded to your systems
 - The private key needs to be stored locally
 - Anywhere on your system, but you will need to provide the path to the key
 - The private key needs to have permission
 - AWS does not accepts keys that are publicly readable



- MacOS and Linux
 - Create the key
 - Put the private key in an easily remembered location
 - Use chmod 400 mykey.pem to change permissions

- Windows: Need to install and use PuTTY
- PuTTy has a tool PuTTYgen that changes key format
 - Open PuTTYGen
 - Select RSA
 - Use Load
 - Switch file type to all
 - Select mykey.pem file
 - Click save private key

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Key							
Public key for pasting into OpenSSH authorized_keys file:							
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAhZjym83TiwRgVG9VxhTvjxwFbvUZeL1D2caL oVsxtA2J8d6AO9tlCFsi7uMldAyDZPFzL0CYZatv0rM+e96XRhSPxt8eC +gLG4C/N2P/G							
+vSFjsKYYEYpVK4wuhz9dILFhVJ/m1TFnZrVADVikVS30j6Ul222uQU							
Key fingerprint: ssh-rsa 2048 02:9e:02:ba.f3:9b:74:b1:5d:dc:93	3:c0:d2:d2:33:0b						
Key comment: rsa-key-20170405							
Key passphrase:							
Confirm passphrase:							
Actions							
Generate a public/private key pair	<u>G</u> enerate						
Load an existing private key file	<u>L</u> oad						
Save the generated key Save public key	<u>S</u> ave private key						
Parameters							
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Number of <u>b</u> its in a generated key:	2048						

- Enable billing alarm
 - Select your name (in US Virginia)
 - Select "My Billing Dashboard"
 - Go to preferences
 - Select Receive Billing Alerts
 - Save preferences

- Now we are ready to use AWS
 - We create a simple webpage
 - This means installing PHP, MySQL, ...
 - Use a number of services:
 - Elastic Load Balancing
 - Elastic Compute Cloud
 - Relational Database Service
 - Elastic File System
 - Security Groups



- Use AWS CloudFormation to do a number of things in the background
 - Create ELB (elastic load balancer)
 - Create RDS (relational database server)
 - Create and attach firewall rules
 - Create two virtual machines running web services
 - Create two VM
 - Mount file system
 - Install Apache and PHP
 - Install WordPress
 - Start the Apache Webserver



 In the AWS Management Console —>Services —> Cloudformation

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AWS Services - Resource	Groups 🗸 🛧	¢	tbobsj 👻	N. Virginia 👻	Support 👻	
CloudFormation ~ Stacks						
	gned AWS CloudFormation console is available now tely redesigned the console to improve the overall look and feel. Try it out now	w and pro	ovide us feed	& back.		
Create Stack Actions D	esign template				C \$	
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	Create a stack AWS CloudFormation allows you to quickly and easily deploy your infrastruct resources and applications on AWS. You can use one of the templates w provide to get started quickly with applications like WordPress or Drupal, or the many sample templates or create your own template. You do not currently have any stacks. Choose Create new stack below to c a new AWS CloudFormation stack. Create new stack Create new stack A StackSet is a container for AWS CloudFormation stacks that lets you prov stacks across AWS accounts and regions by using a single AWS CloudForm template. Create new StackSet	ve ne of create vision				
	Design a template Templates tell AWS CloudFormation which AWS resources to provision and to provision them. When you create a CloudFormation stack, you must subr template. To build and view templates, you can use the drag-and-drop tool called AW CloudFormation Designer. You drag-and-drop the resources that you want to to your template and drag lines between resources to create connections. To Designer to create a template or to open and modify a template, choose De template	mit a WS o add o use				



- Create the stack and select the template
 - Use template from a book
 - <u>https://s3.amazonaws.com/awsinaction-code2/chapter02/</u> <u>template.yaml</u>
 - Look at the specification: A simple document
 - Specify wordpress as stack name
 - Set the key name to the key that you created
 - Should use tags, e.g. to say that this is a wordpress system
 - system: wordpress
 - Specify URL in Template URL



- Cloudformation is now creating your resources
- The wordpress stack will be in status CREATE_IN_PROGRESS
- After a while, status changes to CREATE_COMPLETE

- Investigate your stack
 - Resource groups are collections of of AWS resources
- Create a resource group
 - Set group name to wordpress group
 - Tag system: wordpress
 - Select the region: North Virginia
 - Save



- Select instances in EC2 to see the virtual machines
- Get details on the virtual machines

- Select load balancer
 - Automatically created



- Go back to resource group wordpress
- Select DBinstances under RDS
- Get details of your SQL database

- Network file system EFS
- Cannot access through the resource group
- Need to go through EFS on the service menu



- Select the cost estimator
 - It will tell you that you have to pay about \$35.00 per month for this instance



- Delete your blogging infrastructure
 - Go to CloudFormation Service in Management Console:
 - Select your wordpress stack
 - Open the action menu (Actions)
 - Click Delete Stack