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:	
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E arm a new user.	AWS Accounts Include
 Lans a neturning user and my password is: 	12 Months of Free Tier Access
*********	Including use of Amazon EC2,
Sign in using our secure server.	Amazon aa, and Amazon DynamoDe
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tinging at Date Only

Create accurate contact information

Contact Information		
Compar	Account © Personal Account	
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• Create payment information

Web services			Amazon	Web Services Si
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► Freque	ently Asked Questions			
	Credit/Debit Card	Number	Expiration Date	
			01 \$ 2017 \$	
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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	Ċ •
Services - Resource Groups -	*	🗘 tbobsj 🗸 N. Virginia 🗸 Suppo
AWS Manageme	ant Consola	
Av 5 Manageria		
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 Service, a	latabase, 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
Dalcii Elastic Roapstalk	Amazon Transcribe	AWS Fargate runs and scales your containers
Serverless Application Penository	Amazon Translate	without having to manage servers or
Serveness Application Repository	Amazon Personalize	clusters. Learn more 🔀
	Amazon Forecast	
Storage	Amazon Textract	Visit AWC around the world star Commit
53		visit AWS around the world at a Summit
EFS	Applytics	AWS Global Summits bring the cloud computing
FDX SZ Glasier	Athona	community together to connect, collaborate, and
Storage Gateway	ALTIENA	learn about AWS. Learn more 🗹
AWS Backup	CloudSearch	
Aws backup	Elasticsearch Service	AWS Marketplace
	Kinesis	
🗮 Database	QuickSight [2]	Find, buy, and deploy popular software products
RDS	Data Pipeline	
DynamoDB	AWS Glue	
ElastiCache	MSK	
Neptune		Have feedback?

Select the N.Virginia service center



 Select Cost Explorer in Services

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	aw	/S Services -> Resource Groups ->	ب	tbobsj 🕶 Global 👻 Support 🕶
ß	AWS	S Cost Explorer		@ -
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8		Mar-14 50.00 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	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

😴 PuTTY Key Generator	? ×				
<u>File Key Conversions Help</u>					
Key					
Public key for pasting into OpenSSH authorized_keys file:					
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAhZjym83TiwRgVG9VxhTvjxwFbvUZeL1D2caL oVsxtA2J8d6AO9tICFsi7uMIdAyDZPFzL0CYZatv0rM+e96XRhSPxt8eC +gLG4C/N2P/G					
+vSFjsKYYEYpVK4wuhz9dILFhVJ/m1TFnZrVADVikVS30j6Ul222uQU	J5BOsSREsVAM ∨				
Key fingerprint: ssh-rsa 2048 02:9e:02:ba.f3:9b:74:b1:5d:dc:9	3:c0:d2:d2:33:0b				
Key comment: rsa-key-20170405					
Key p <u>a</u> ssphrase:					
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					
Type of key to generate: ● <u>R</u> SA ○ <u>D</u> SA ○ <u>E</u> CDSA ○ ED <u>2</u> 5519	○ SSH- <u>1</u> (RSA)				
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	9 Groups 👻 👎	¢	tbobsj 👻	N. Virginia 👻	Support 👻	
CloudFormation < Stacks						
The redest We've complete	gned AWS CloudFormation console is available now ately redesigned the console to improve the overall look and feel. Try it out now	v and prov	vide us feedb	8 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 infrastruc resources and applications on AWS. You can use one of the templates we provide to get started quickly with applications like WordPress or Drupal, on the many sample templates or create your own template. You do not currently have any stacks. Choose Create new stack below to create new AWS CloudFormation stack. Create new stack Create new stack A StackSet is a container for AWS CloudFormation stacks that lets you provid stacks across AWS accounts and regions by using a single AWS CloudFormate. Create new StackSet Create new StackSet	cture /e ne of create /ision nation				
	Design a template Templates tell AWS CloudFormation which AWS resources to provision and it to provision them. When you create a CloudFormation stack, you must submit 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 Designer.	how mit a WS o add o use esign				



- 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