AWS Certified Developer - Associate 2018

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# Sekcja 1: Introduction

## 1. Introduction To The Certified Developer - Associate Course

<https://acloud.guru/>

<https://read.acloud.guru/>

## 2. Information For Students Who Have Completed The Solutions Architect Course

## 3. Setting The Right Expectations, This Is Not A Course To Teach You How To Code

## 4. What You'll Need To Do This Course

* putty
* <https://aws.amazon.com/free/>

## 5. Exam Blue Print

<https://aws.amazon.com/certification/certified-developer-associate/>

<https://d1.awsstatic.com/training-and-certification/docs-dev-associate/AWS_certified_developer_associate_blueprint.pdf>

## 6. The Free Alexa Skill For Amazon Echo

# Sekcja 2: AWS - 10,000 Feet Overview

## 7. The History So Far

<https://acloud.guru/aws-this-week>

## 8. 10,000 Foot Overview - 1 of 4

AWS Global Infrastructure

* Region - geographical area
* Availability Zone - Data center
* Edge location - endpoint to caching content, consists CloudFront or Amazon CDN

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-regions-availability-zones.html>

## 9. 10,000 Foot Overview - 2 of 4

Compute

* EC2 - elastic computing cloud - virtual machine within VPC
* EC2 Container Service - to run docker containers
* Elastic Beanstalk
* Lambda
* Lightsail - Virtual private service
* Batch - for batch computing in a cloud

Storage

* S3 - simple storage service
* EFS - elastic file system, network attached storage
* Glacier - for archive data, very cheap
* Snowball - for large amount of data
* Storage gateway - virtual machine

Databases

* RDS - relational database service
* Dynamo DB - non relational database
* Elasticache - caching service
* Redshift - for BI and data warehousing [elastic.co/guide/en/elasticsearch/reference/6.2/query-dsl-simple-query-string-query.html](http://elastic.co/guide/en/elasticsearch/reference/6.2/query-dsl-simple-query-string-query.html)

Migration

* AWS Migration HUB - to track application during migration to AWS
* Application Discovery Service - automated detect applications and dependencies
* Database Migration Service - tool to migrate on premise databases to AWS
* Server Migration Service - tool to migrate servers to AWS
* Snowball - for migratinf large amount of data

Networking and Content Delivery

* VPC - Virtual Private Cloud - Virtual data center
* ClaudFront - Amazon CDN (Content Delivery Network) (Edge locations)
* Route53 - Amazon DNS service
* API Gateway - way to create API
* Direct Connect - for direct connection to Amazon from office or data center

Developer Tools

* CodeStart - gather group of developers working together, project managing your code, continuous delivery toolchain,
* CodeCommit - place to store your code using diference source control service.
* CodeBuild - compile code and run tests and produce software packages
* CodeDeploy - deployment service
* CodePipeline - continuous derlivery service
* X-Ray - tracing and debug application
* Cloude 9 - IDE environment for develop code in browser

## 10. 10,000 Foot Overview - 3 of 4

Management Tools

* CloudWatch - monitoring tool
* CloudFormation - for solution architect
* CloudTrial - log changes to your AWS environment
* Config - monitors configuration entire AWS
* OpsWorks - very similar to elastic beans stalk, automation of configuration your environments
* Service Catalog - catalog of services
* Systems Manager - to managing AWS resources
* Trusted advisor - give you advice across different disciplines
* Managed services

Media Services

* Elastic Transcoder - can resize video
* MediaConvert - file based video transcoding service, broadcasts
* MediaLive - live video processing service, High Quality video streams
* MediaPackage - prepare and protect videos for delivery over internet
* MediaStore - storage service optimized for media
* MediaTailor - targeted advertising into video streams without sacrificing broadcast level

Machine learning

* SageMaker - for deep learning (on a neutral network)
* Comprehend - sentiment analysis around data
* DeepLens - artificially web camera, physical piece of hardware you can buy
* Lex - this power amazon alexa service, is a way to communicate with customers, artificial intelligent to chat with customers
* Machine Learning - entry level, not neutral network, gather data, analysis and predict.
* Polly - take taxts and turn it into speech
* Recognition - recognize what is in a file (video and images)
* Amazon translate - translate english into other languages
* Amazon transcribe - automatic speech recognition, upload video and mp3 ant turn them into a text

Analytics

* Athena - run SQL on your s3 storage
* EMR - Elastic Map Reduce, for processing large amount of data <https://aws.amazon.com/emr/>
* CloudSearch - search services for AWS
* ElastcSearch Service - search services for AWS
* Kinesis - for big data
* Kinesis Video Streams - analysis video streams
* Quick Sight - amazon business intelligence  BI tool
* Data Pipeline - way to move data between AWS services
* Glue - uses for ETL (extract, transform, load)

## 11. 10,000 Foot Overview - 4 of 4

Security & Identity & Compliance

* IAM - identity access management
* Cognito - for device authentication to get access to AWS resources
* GuardDuty - monitore malicious activity in aws account
* Inspector - agent to run for verify any vulnerabilities
* Macie - scan s3 and look personal identify information
* Certificate Manager - you get SSL certificates for free when using AWS and register domain through route 53. For managing ssl certificates
* CloudeHSM - hardware security module for store your keys (public, privates). You use this keys to access EC2 instances. An other keys e.g. encryption keys.
* Directory services - to integrate Microsoft Active Directory service with Amazon AWS service
* WAF - web application firewall - layer 7 firewall to stop cross-site scripting, to stop SQL injection
* Shield - to prevent DDOS attack. If you have shield advance and suffer from DDOS then Amazon will not charger you and compay your bill
* Artifact - for audit and compliance. on-demand to download a compliance report and other reports

Mobile Services

* Mobile Hub - for serv services for mobile application. You should user AWS mobile SDK
* Pinpoint - push notification to drive mobile engagement
* AWS AppSync - its automatically update the date in web and mobile applications
* Device Farm - way to test your apps on real devices (android, iPhone, etc)
* Mobile Analytics

AR / VR

* Sumerian - common set of tools to create AR, VR, 3D design. Is still in a preview

Application Integration

* Step Functions - managing different lambda functions
* Amazon MQ - message queues
* SNS - notification service, e.b. if bill goes over 10$ we are going to get a message to our emails
* SQS - for decoupling infrastructure
* SWF - simple work flow service

Customer engagement

* connect - contact center as a service
* simple email service

Business Productivity

* Alexa for business
* Chime -used for video conferencing, record meetings
* Work Docs - like dropbox for AWS
* WorkMail - like office 365, like gmail

Desktop and app streaming

* Workspaces - VDI solution - stream desktop operating system to device
* Appstream 2.0 - stream application to device

Internet of things

* iOT
* iOT Device Management
* Amazon FreeRTOS - operating system for microcontrollers
* Greengrass - local compute messaging data caching sync

Game Development

* GameLift - service to help develop games

## 12. Don't Freak Out!

Pokazanie na jaki egzamin jakie serwisy wpadają

Solution Architect - Associate:

* AWS Global Infrastructure
* Compute
* Storage
* Databases
* Migration
* Networking and Content Delivery
* Management Tools
* Analytics
* Security & Identity & Compliance
* Application Integration
* Desktop and app streaming

Developer Associate

* AWS Global Infrastructure
* Compute
* Storage
* Databases (particular dynamo db)
* Networking and Content Delivery
* Management Tools
* Analytics
* Security & Identity & Compliance
* Application Integration

Sysops Administrator Associate

* AWS Global Infrastructure
* Compute
* Storage
* Databases
* Networking and Content Delivery
* Management Tools
* Security & Identity & Compliance
* Application Integration

## 13. Setting Up A Free Tier Account

<https://aws.amazon.com/>

instrukcja zakładania konta

## 14. AWS This Week

<https://acloud.guru/aws-this-week>

Quiz 1: 10,000 Feet Overview Review

# Sekcja 3: Identity Access Management (IAM)

## 15. IAM 101

IAM allows you to manage users and their level of access to the AWS Console

* centralized control of your AWS account
* shared access to your AWS account
* Granular permissions
* Identity federation (include Active Directory, Facebook, LinkedIn, etc. )
* Multifactor Authentication
* Provide temporary access for users/devices and services when necessary
* allows you to set up your own password rotation policy
* integration with many different AWS services
* support PCI DSS Compliance

Critical terms:

* User - end users (think people)
* Group - A collection of users under one set of permissions
* Role - you create roles and can then assign them to AWS resources
* Policies - A document that define one (or more permissions)

## 16. IAM - Lab

* Turn on MFA
* create user
* create group
* create role

## 17. Security Token Service (STS)

Grant users limited and temporary access to AWS resources. Users can come from three sources:

* Federation (typically Active Directory)
  + Users Security Assertion Markup Language (SAML)
  + Grants temporary access based off the users Active Directory credentials. Does not need to be a user in IAM
  + Single sign on allows users to log in to AWS console without assigning IAM credentials
* Federation with Mobile Apps
  + Use Facebook/Amazon/Google or other OpenID providers to log in.
* Cross Account Access
  + Let’s users from one AWS account access resources in another

Understanding Key Terms

* Federation: combining or joining a list of users in one domain (such as IAM) with a list of users in another domain (such as  Active Directory, Facebook etc.)
* Identity Broker: a service that allows you to take identity from point A and join it (federate it) to point B
* Identity Store - Service like Active Directory, Facebook, Google etc.
* Identities - a user of a service like Facebook etc.

## 18. Active Directory Federation

You can authenticate by Active directory by using SAML

First authenticate by active directory, then you would be assigned the temporary security credentials.

## 19. Web Identity Federation

<https://aws.amazon.com/articles/web-identity-federation-with-mobile-applications/>

## 20. IAM - Summary

Test 2: Identity Access Management Quiz

# Sekcja 4: EC2 & Getting Setup

## 21. EC2 101 - Part 1

What is EC2?

Amazon Elastic Compute Cloud (Amazon EC2) ia a web service that provides resizable compute capacity in the cloud. Amazon EC2 reduce the time required to obtain and boot new server instance to minutes, allowing you to quickly scale capacity, boot up and down, as your computing requirements change.

Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use. Amazon EC2 provides developers the tools to build failure resilient applications and isolate themselves from common failure scenarios.

EC2 Options

* On Demand - allows you to pay a fixed rate by the hour (or by the second) with on commitment.
* Reserved - provides you with a capacity reservation, and offer a significant discount on the hourly charge for an instance. 1 Year or 3 Year Terms.
* Spot - enables you to bid whatever price you want for instance capacity, providing for even greater savings if your applications have start and end times
* Dedicated Hosts - Physical EC2 server dedicated for your use. Dedicated Hosts can help you reduce costs by allowing you to use your existing server bound software licenses.

On Demand

* Perfect for users that want the low costs and flexibility of Amazon EC2 without any up-front payment or long-term commitment
* Applications with short term, spiky, or unpredictable workloads that cannot be interrupted
* Applications being developed or tested on Amazon EC2 for the first time

Reserved Instances

* Applications with steady state or predictable usage
* Applications that require reserved capacity
* Users can make up-front payments to reduce their total computing costs even further
* Standart RIs (Reserved Instances) (Up to 75% off on-demand)
* Convertible RIs (Up to 54% off on-demand) feature the capability to change the attributes of the RI as long as the exchange results in the creation of Reserved Instances of equal or greater value.
* Scheduled RIs are available to launch within the time window you reserve. This option allows you to match your capacity reservation to a predictable recurring rchedule that only requires a fration of a day, a week, ora month

Spot Instances

* Applications that have flexible start and end time
* Applications that are only feasible at very low compute price
* Users with an urgent need for large amounts of additional computing capacity

Dedicated Hosts

* Useful for regulatory requirements that may not support multi0tenant virtualization.
* Great for licensing which does not support multi-tenancy or cloud deployments.
* Can be purchased On-Demand  (hourly)
* Can be purchased as a Reservation for up to 70% off the On-Demand price

EC2 Instances Types

<https://aws.amazon.com/ec2/instance-types/>

|  |  |  |
| --- | --- | --- |
| Family | Speciality | Use case |
| F1 | Field Programmable Gate Array | Genomics research, financial analytics, real time video processing, big data etc. |
| I3 | High Speed Storage | NoSQL DBs, Data Wearhousing etc |
| G3 | Graphics Intensive | Video Encoding/ 3D applications Streaming |
| H1 | High Disk Throughput | MapREduce-based workloads, distributed file systems such as HDFS and MapR-FS |
| T2 | Lowest Cost, General Purpose | Web Servers/Small DBs |
| D2 | Dense Storage | Fileservers/Data Warehousing/Hadoop |
| R4 | Memory Optimized | Memory Intensive Apps/DBs |
| M5 | General Purpose | Application Servers |
| C5 | Compute Optimized | CPU Intensive Apps/DBs |
| P3 | Graphics/General Purpose GPU | Machine Learning, Bit Coin Mining etc |
| X1 | Memory Optimized | SAP HANA/Apache etc |

How to remember

* D for Density
* R for RAM
* M - main choice for general purpose apps
* C for Compute
* G - Graphics
* I for IOPS
* F for FPGA
* T cheap general purpose (think T2Micro)
* P - Graphics (think Pics)
* X - Extreme Memory

What is EBS

Amazon EBS allows you to create storage volumes and attach them to Amazon EC2 instances. One attached, you can create a file systemson to pot these volumes, run a database, or use them in any other way you would use a block device. Amazon EBS volumes are placed in a specyfic Availability Zone, where they are automatically replicate to protect you from the failure of a single component.

EBS Volume Types

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EBSVolumeTypes.html>

* General Purpose SSD (GP2)
  + General purpose, balances both price and performance
  + Ratio of 3 IOPS per GB with up to 10000 IOPS and the ability to burst up to 3000 IOPS for extended periods of time for volumes at 3334 GiB and above.
* Provisioned IOPS SSD (IO1)
  + Designed for I/O intensive applications such as large relationa or NoSQL databases,
  + Use if need more than 10000 IOPS
  + Can provision up to 20000 IOPS per volume
* Throughput Optimized HDD (ST1)
  + Big data
  + Data warehouses
  + Log processing
  + Cannot be a boot volume
* Cold HDD (SC1)
  + Lowest Cost Storage for infrequently accessed workloads
  + File Server
  + Cannot be a boot volume
* Magnetic (Standard)
  + Lowest cost per gigabyte of all EBS volume types that is bootable. Magnetic volumes are ideal for workloads where data is accessed infrequently, and applications where the lowest storage cost is important.

If a Spot instance is terminated by Amazon EC2, you will not be charged for a partial hout of usage. However, if you terminate the instance yourself, you will be charged for the complete hour in which the instance ran.

SSD

* General Purpose SSD - balances price and performance for a wide variety of workloads.
* Provisioned IOPS SSD - Highest - performance SSD volume for mission-critical low-latency or high-throughput workloads

Magnetic

* Throughput Optimized HDD - Low cost HDD volume designed for frequently accessed, throughput-intensive workloads
* Cold HDD - Lowest cost HDD volume designed for less frequently accessed workloads
* Magnetic - Previous Generation. Can be a boot volume.

## 22. EC2 101 - Part 2

What is EBS?

Amazon EBS allows you to create storage volumes and attach them to Amazon EC2 instances. Once attached, you can create a file system on top of these volumes, run a database, or use them in any other way you would use a block device. Amazon EBS volumes are placed in a specific Availability Zone, where they are automatically replicated to protect you from the failure of a single component.

You cannot mount 1 EBS volume to multiple EC2 instances, instead use EFS.

## 23. Launch Our First EC2 Instance - Part 1

sudo su

force update pathes to operating system

yum update -y

Install apache

yum install httpd -y

cd /var/www/html

nano index.html

start apache

service httpd start

go to public IP in your browser <http://52.59.194.100/>

## 24. Launch Our First EC2 Instance - Part 2

Summary

* Termination Protection is turned off by default, you must turn it on
* On a EBC-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated
* EBS Root Volumes of your DEFAULT AMI’s cannot be encrypted. You can also use a third party tool (such as bit locker etc.) to encrypt the root volume, or this can be done when creating AMI’s (lab to follow) in the AWS console or using the API.
* Additional volumes can be encrypted

## 25. How to use Putty (Windows Users Only)

Puttygen (PuTTY Key Generator)

* Load private key from pem file
* Save private key with extension ppk

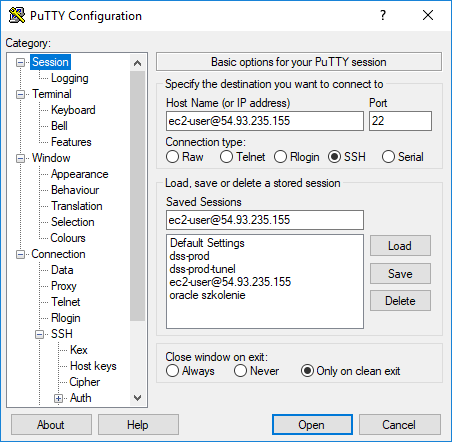
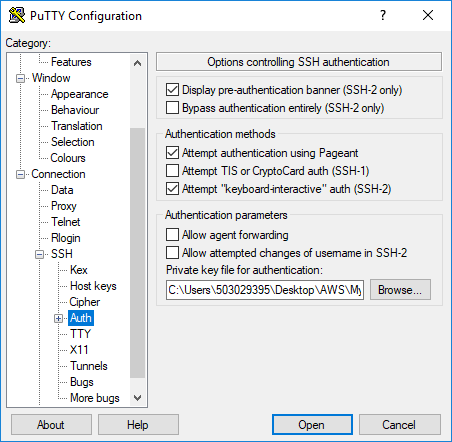
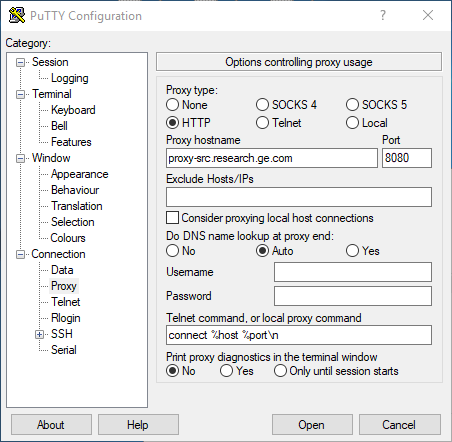
Putty

Hostname: ec2-user@ip

Connection->SSH->Auth: Browse and select private key file with extension ppk

Connection->Proxy:

* Proxy Type: HTTP
* Proxy hostname: proxy-src.research.ge.com
* Port: 8080

## 26. Security Groups

Security group is a Virtual Firewall.

1 instance can have multiple security groups.

Automatyczny start apache

chkconfig httpd on

Reguły w grupach są statefull

Jeżeli ma się gegułę HTTP inbound to domyślnie się ma też taką regułę na outbound nawet jak jej nie widać.

Przy regułach inbound wszystk odomyślnie jest blokowane. Trzeba dopiero to selektywnie odblokowywać.

Manipulacja grupami

Instances: Actions->Networking->Change Security Groups

Można przypisać pare grup do instancji.

Summary

* All Inbound Traffic is Blocked By Default
* All Outbound Traffic is Allowed
* Changes to Security Groups take effect immediately
* You can have aby number of EC2 instances within a security group.
* You can have multiple security groups attached to EC2 Instances
* Security Groups are STATEGUL
  + If you create an inbound rule allowing traffic in, that traffic is automatically allowed back out again.
* You cannot block specific IP address using Security Groups, instead use Network Access Control Lists.
* You can specify allow rules, but not deny rules.

## 27. Upgrading EBS Volume Types – Lab

Dyski EBS są w tej samej Availabillity Zone co instancje EC2.

Volumes & Snapshots

* Volumes exists on EBS
  + Virtual Hard Disk
* Snapshots exist on S3
* Snapshots are point in time copies of Volumes.
* Snapshots are incremental – this means that only the blocks that have changes since your last snapshot are moved to S3.
* If this is your firs snapshot, it may take some time to create.

Snapshots of Root Device Volumes

* To Create a snapshot for Amazon EBS volumes that serve as root devices, you should stop the instance before taking the snapshot.
* However you can take a snap while the instance is running.
* You can create AMI’s from both Volumes and Snapshot
* You can change EBS volume size on the fly, including changing the size and storage type.
* Volumes will ALWAYS be in the same availability zone as the EC2 instances.
* To move an EC2 volume from one AZ/Region to another, take a snap or image of it, then copy it to the new AZ/Region.

Volumes vs Snapshots – Security

* Snapshots of encrypted volumes are encrypted automatically.
* Volumes restored from encrypted snapshots are encrypted automatically.
* You can share snapshots, but only if they are unencrypted.
  + These snapshots can be shared with other AWS accounts or made public.

## 28. EFS – Lab

What is EFS

Amazon Elastic File System (Amazon EFS) is a file storage for Amazon Elastic Compute Cloud (Amazon EC2) instances. Amazon EFS is easy to use and provides a simple interface that allows you to create and configure file systems quickly and easily. With Amazon EFS, storage capacity is elastic, growing and shrinking automatically as you add and remove files, so your applications have the storage they need, when they need it.

EFS Features

* Supports the Network File Systems version 4 (NFSv4) protocol
* You only pay for the storage you use (no pre-provisioning required)
* Can scale up to the petabytes
* Can support thousands of concurrent NFS connections
* Data is stored across multiple AZ’s within a region
* Read After Write Consistency

## 29. The AWS CLI - Using Credentials

<https://aws.amazon.com/cli/>

w putty piszemy:

aws [service] command

czyli np:

aws s3 ls

konfiguracja danych uwierzytelniania

aws configure

pliki z kluczami dostępu są trzymane w katalogu ~/.aws

lista dostępnych komend dla serwisu

aws [service] help

aws ec2 describe-instances

aws ec2 terminate-instances --instance-ids [ids]

## 30. The AWS CLI - Using Roles

Dzięki rolom nie trzeba było robić AWS congure. AWS cli działało na podstawie ról.

## 31. CLI Commands For The Developer Exam

<https://docs.aws.amazon.com/cli/latest/reference/ec2/index.html>

aws ec2 describe-instances

aws ec2 describe-images

aws ec2 describe-images --owners amazon --filters "Name=platform,Values=windows" "Name=root-device-type,Values=ebs"

aws ec2 run-instances --image-id ami-9a91b371 --count 1 --instance-type t2.micro --key-name MyEC2KeyPair --security-groups MyWebDMZ

aws ec2 terminate-instances --instance-ids i-0c1c21b14acad6242

Exam Tips

Use

* AWS EC2 DESCRIBE-INSTANCES
* AWS EC2 DESCRIBE-IMAGES
* AWS EC2 RUN-INSTANCES

Do not confuse START-INSTANCES with RUN-INSTANCES

## 32. S3 CLI & Regions

aws s3 ls

aws s3 cp --recursive s3://acloudguru-frankfurt1 /home/ec2-user

## 33. Bash Scripting

Wklejanie skryptu podczas tworzenia instancji

## 34. Installing PHP & Composer

<https://docs.aws.amazon.com/sdk-for-php/v3/developer-guide/getting-started_installation.html>

## 35. Using the PHP SDK to access S3

## 36. EC2 Instance Meta-data

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-instance-metadata.html>

curl http:// 169.254.169.254/latest/meta-data/

curl http:// 169.254.169.254/latest/meta-data/public-ipv4

yum install httpd php php-mysql -y

service httpd start

yum install git

git clone https://github.com/acloudguru/metadata

<http://35.158.118.153/metadata/curlexample.php>

## 37. Elastic Load Balancers - Exam Tips

cd /var/www/html

nano healtcheck.html

Classic Load Balancer – pracują w warstwie 4

Application Load Balancer – pracują w warstwie 7 (aplikacyjnej)

Elastic Load Balancers

* Instances monitored by ELB are reported as: InService or OutOfService
* Health Checks check the instance health by talking to it
* Have their own DNS name. You are never given an IP address.
* Read the ELB FAQ for Classic Load Balancers
* Want to deep dive on application load balancers? Check out our deep dive course!

## 38. SDK's - Exam Tips

Know the available SDK’s

<https://aws.amazon.com/tools/>

* Android, iOS, JavaScript (Browser)
* Java
* .NET
* Node.js
* PHP
* Python
* Ruby
* Go
* C++

SDK Default Region

* Default Region – US-EAST-1
* Some have default region (Java)
* Some do not (Node.js)

## 39. Lambda

What Is Lambda?

* Data Centres
* Hardware
* Assembly Code/Protocols
* High Level Languages
* Operating Systems
* Application Layer/AWS APIs
* AWS Lambda

AWS Lambda is a compute service where you can upload your code and create a Lambda function. AWS Lambda takes care of provisioning and managing the servers that you use to run the code. You don’t have to worry about operating systems, pathing, scaling, etc. You can use Lambda in the following ways.

* As an event-driven compute service where AWS Lambda runs your code in response to events. These events cloud be changes to data in Amazon S3 bucket or an Amazon DynamoDB table.
* As a compute service to run your code in response to HTTP requests using Amazon API Gateway or API calls made using AWS SDKs. This is what we use at A Cloud Guru.

What Languages?

* Node.js
* Java
* Python
* C#

How Is Lambda Priced?

* Number of requests
  + First 1 million requests are free. $0.20 per 1 million requests thereafter.
* Duration
  + Duration is calculated from the time your code begins executing until it returns or otherwise terminates, rounded up to the nearest 100ms. The price depends on the amount of memory you allocate to your function. You are charged $0.00001667 for every GB-second used.

Why Is Lambda Cool?

* NO SERVERS!
* Continuous Scaling
* Super cheap!

Lambda – Exam Tips

* Lambda scales out (not up) automatically
* Lambda functions are independent, 1 event = 1 function
* Lambda I serverless
* Know what services are serverless!
* Lambda functions can trigger other lambda functions, 1 event can = x functions if functions trigger other functions
* Architectures can get extremely complicated, AWS X-ray allows you to debug what is happening
* Lambda can do things globally, you can use it back up s3 buckets to other s3 buckets etc.
* Know your triggers

## 40. Summary of EC2 Section

Exam Tips EC2

* Know the differences between:
  + On Demand
  + Spot
  + Reserved
  + Dedicated Hosts
* Remember with spot instances
  + If you terminate the instance, you pay for the hour
  + If AWS terminate the spot instance, you get the hour it was terminated in for free.

Exam Tips EBS

EBS Consist of:

* SSD, General Purpose – GP2 (Up to 10000 IOPS)
* SSD, Provisioned IOPS - IO1 (More than 10000 IOPS)
* HDD, Throughput Optimized – ST1 – frequently accessed workloads
* HDD, COLD – SC1 – less frequently accessed data.
* HDD, Magetic – Standard – cheap, infrequently accessed storage

You cannot mount 1 EBS volume to multiple EC2 instances, instead use EFS.

EC2 Lab Exam Tips

* Termination Protection is turned off by default, you must turn it on.
* On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated.
* Root Volumes cannot be encrypted by default, you need a third party tool (such as bit locker etc) to encrypt the root volume.
* Additional volumes can be encrypted.

Volumes vs Snapshots

* Volumes exist on EBS
  + Virtual Hard Disk
* Snapshots exists on S3
* You can take a snapshot of a volume, this will store that volume on S3.
* Snapshots are point in time copies of Volumes.
* Snapshots are incremental, this means that only the block that have changed since your last snapshot are moved to s3.

Volumes vs Snapshot – Security

* Snapshot of encrypted volumes are encrypted automatically.
* Volumes restored from encrypted snapshots are encrypted automatically.
* You can share snapshots, but only if they are unencrypted.
  + These snapshots can be shared with other AWS accounts or made public

Snapshots of Root Device Volumes

* To create a snapshot for Amazon EBS volumes that serve as root devices, you should stop the instance before taking the snapshot.

EBS vs Instance Store – Exam Tips

* Instance Store Volumes are sometimes called Ephemeral Storage.
* Instance store volumes cannot be stopped. If the underlying host fails, you will lose your data.
* EBS backed instances can be stopped. You will not lose the data on this instance if it is stopped.
* You can reboot both, you will not lose your data.
* By default, both ROOT volumes will be deleted on termination, however with EBS volumes, you can tell AWS to keep the root device volume.

How can I take a Snapshot of a RAID Array?

* Problem – Take a snapshot, the snapshot excludes data held in the cache by applications and the OS. This tends not to matter on a single volume, however using multiple volumes in a RAID array, this can be a problem due to interdependencies of the array.
* Solution – Take an application consistent snapshot.
* Stop the a[[lication from writing to disc.
* Flush all caches to the disk.
* How can we do this?
  + Freeze the file systems
  + Unmount the RAID Array
  + Shutting down the associated EC2 instance.

Amazon Machine Images – Exam Tip

AMI’s are regional. You can only launch an AMI from the region in which it is stored. However, you can copy AMI’s to other regions using the console, command line or the Amazon EC2 API.

Exam Tips

* Standard Monitoring = 5 minutes
* Detailed Monitoring = 1 Minute
* Cloud Watch is for performance monitoring
* CloudTrail is for auditing

What can I do with Cloudwatch?

* Dashboards – Creates awesome dashboards to see what is happening with your AWS environment.
* Alarms – Allows you to set Alarms that notify you when particular thresholds are hit.
* Events – CloudWatch Events help you to respond to state changes in your AWS resources.
* Logs – CloudWatchLogs helps you to aggregate, monitor, and store logs.

Roles Lab

* Roles are more secure than storing your access key and secret access key on individual EC2 instances.
* Roles are easier to manage
* Roles can be assigned to an EC2 instance AFTER it has been provisioned using both the command line and the AWS console.
* Roles are universal, you can use them in any region.

Instance Meta-data

* Used to get information about an instance (such as public ip)
* Curl <http://169.254.169.254/latest/meta-data/>

EFS Features

* Supports the Network File Systems version 4 (NFSv4) protocol
* You only pay for the storage you use (no preprovisioning required)
* Can scale up to the petabytes
* Can support thousands of concurrent NFS connections
* Data is stored across multiple AZ’s within a region
* Read After Write Consistency

What Is Lambda?

AWS Lambda is a compute service where you can upload your code and create a Lambda function. AWS Lambda takes care of provisioning and managing the servers that you use to run the code. You don’t have to worry about operating systems, pathing, scaling, etc. You can use Lambda in the following ways.

* As an event-driven compute service where AWS Lambda runs your code in response to events. These events cloud be changes to data in Amazon S3 bucket or an Amazon DynamoDB table.
* As a compute service to run your code in response to HTTP requests using Amazon API Gateway or API calls made using AWS SDKs. This is what we use at A Cloud Guru.

# Sekcja 5: S3

## 41. S3 Essentials

What is S3?

S3 provides developers and IT teams with secure, durable, high-scalable object storage. Amazon s3 is easy to use , with a simple web service interface to store and retrieve any amount of data from anywhere on the web.

S3 is a safe place t ostore your files. It is Object based storage.

The data is spread across multiple devices and facilities.

S3 – The Basics

* S3 is Object based i.e. allows you to upload files.
* Files can be from 0 Bytes to 5 TB.
* There is unlimited storage
* Files are stored in Buckets.
* S3 is a universal namespace, that is, names must be unique globally.
* <https://s3-eu-west-1.amazonaws.com/acloudguru>
* When you upload a file to S3 you will receive a HTTP 200 code if the upload was successful

Data Consistency Model For S3

* Reads after Write consistency for PUTS of new Objects
* Eventual Consistency for overwrite PUTS and DELETES (can take some time to propagate)

S3 – S3 Is a simple key, value store

* S3 is object based. Object consistent of the following;
  + Key (This is simply the name of the object)
  + Value (This is simply the data and is made up of a sequence of bytes).
  + Version ID (important for versioning)
  + Metadata (Data about the data you are storing)
  + Subresources
    - Access control list
    - Torrent

S3 – The Basics

* Build for 99,99% availability for the S3 platform.
* Amazon Guarantee 99,9% availability
* Amazon Guarantee 99,999999999% durability for S3 information. (Remember 11x9’s).
* Tired storage available
* Lifecycle management
* Versioning
* Encryption
* Secure your data using Access Control Lists and Bucket Policies

S3 – Storage Tires/Classes

* S3 – 99,99% availability, 99,999999999% durability, stored redundantly across multiple devices in facilities and is designed to sustain the loss of 2 facilities concurrently.
* S3 – IA (Infrequently Accessed) For data that is accessed less frequently, but required rapid access when needed. Lower fee then S3, but you are charged a retrieval fee.
* Reduced Redundancy Storage – Designed to provide 99,99% durability and 99,99% availability of object over a given year.
* Glacier – Very cheap, but used for archival only. It takes 3-5 hours to restore from Glacier.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Standard | Standard – Infrequently Access | Reduced Redundancy Storage | Amazon Glacier |
| Durability | 99,999999999% | 99,999999999% | 99,99% | 99,999999999% |
| Availability | 99,99% | 99,9% | 99,99% | N/A |
| Availability SLA | 99,9% | 99% |  | N/A |
| Minimum object size | N/A | 128KB\* |  | N/A |
| Minimum storage duration | N/A | 30 days |  | 90 days |
| Retrieval Fee | N/A | Per GB retrieved |  | Per GB retrieved\*\* |
| Concurrent facility fault tolerance | 2 | 2 | 1 |  |
| SSL Support | Yes | Yes | Yes |  |
| First byte latency | Milliseconds | Milliseconds | Milliseconds | Select minutes or hours\*\*\* |
| Storage class | Object level | Object level |  | Object level |
| Lifecycle Transitions | Yes | Yes |  | Yes |
| Lifecycle Management Policies | Yes | Yes | Yes |  |

What is Glacier?

Glacier is an extremely low-cost storage service for data archival. Amazon Glacier stores data for as little as $0,01 per gigabyte per month, and it is optimized for data that is infrequently accessed and for which retrieval times of 3 to 5 hours are suitable.

S3 – Charges

* Charges for:
  + Storage
  + Requests
  + Storage management pricing
  + Data transfer pricing
  + Transfer acceleration

What is S3 transfer acceleration?

Amazon s3 Transfer acceleration enables fast, easy and secure transfer of files over long distances between your end user and an s# bucket.

Transfer Acceleration takes advantage of Amazon Cloud Front’s globally distributed edge locations. As the data arrives at an edge location, data is routed to Amazon S3 over an optimized network path.

S3 Exam Tips for S3 101

* Remember that S3 is object based i.e. allows you to upload files.
* Files can be form 0 Bytes to 5 TB
* There is unlimited storage
* Files are stored in Buckets
* S3 I universal namespace, that is names must be unique globally.
* <https://s3-eu-west-1.amazonaws.com/acloudguru>
* Reads after Write consistency for PUTS of new Objects
* Eventual Consistency for overwrite PUTS and DELETES (can take some time to propagate)
* S3 storage Classes/Tires
  + S3 (durable, immediately available, frequently accessed)
  + S3 IA (durable, immediately available, infrequently accessed)
  + S3 Reduced Redundancy Storage (data that is easily reproducible, such as thumb nails etc).
  + Glacier – Archived data, where you can wait 3-5 hours before accessing.
* Remember core fundamentals of an S3 objects:
  + Key (name)
  + Value (data)
  + Version ID
  + Metadata
  + Subresources
    - ACL
    - Torrent
* Object based storage only (for iles)
* Not suitable to install an operating system on.
* Successfully upload will generate a HTTP 200 status code.
* Read the S3 FAQ before taking the exam. It comes up A LOT!

## 42. Creating An S3 Bucket Using The Console

Create an S3 Bucket – Exam Tips

* Bucket are universal name space
* Upload an object to S3 receive a HTTP 200 Code
* S3, S3 IA, S3 Reduced Redundancy Storage
* Encryption
  + Client side encryption
  + Server side encryption
    - Server side encryption with Amazon S3 Managed Keys (SSE-S3)
    - Server side encryption with KMS (SSE-KMS)
    - Server side encryption with Customer Provided Keys (SSE-C)
* Control access to buckets using either a bucket ACL or using Bucket Policies
* By default buckets are private and all objects stored inside them are private.

## 43. Create An S3 Website

## 44. CORS Configuration

Tutaj jestem

## 45. Build A Serverless Webpage

## 46. Using Polly To Help You Pass Your Exam - A Serverless Approach - Part 1

## 47. Using Polly To Help You Pass Your Exam - A Serverless Approach - Part 2

## 48. Build An Alexa Skill

## 49. S3 Version Control

## 50. Cross Region Replication

## 51. S3 Lifecycle Management & Glacier

## 52. Cloud Front Overview

## 53. Create a CDN

## 54. S3 - Security & Encryption

## 55. Storage Gateway

## 56. Snowball

## 57. S3 Transfer Acceleration

## 58. Guru Of The Week

## 59. S3 Summary

Pomocne komendy  
Podłączenie się przez putty:

ssh ec2-user@52.59.194.100 -i MyEC2KeyPair.pem

z pracy jest jednak problem.

to w git bashu można, tak jak on na maku robi. tylko przy ssh trzeba ominąć proxy, hint od Jurka:

ssh ec2-user@52.59.194.100 -i MyEC2KeyPair.pem -o "ProxyCommand=C:/Program\ Files/Git/mingw64/bin/connect.exe -H <http://proxy-src.research.ge.com:8080/> %h %p"

force update pathes to operating system

yum update -y

Install apache

yum install httpd -y

start apache

service httpd start

Automatyczny start apache

chkconfig httpd on

sudo yum install mysql-server

service mysqld start