AWS Cloud Architecture

Preston Chapman

NTS336 - Cloud Infrastructure and Security

University of Advancing Technology

Aaron Rodriguez

Sunday, August 24, 2025

Contents

Contents 2

Overview 4

Foundation and Identity Services 4

- Architecture 4
- IAM 4

Core Infrastructure Services 4

- EC2 4
- S3 5

Data Management and Networking 5

- RDS 5
- DynamoDB 5
- VPC Networking 6

Advanced Services and Automation 6

- Security 6
- Lambda 6
- CloudWatch 7
- CloudFormation 7

Enterprise Operations and Management 7

High Availability 7

Scaling 8

DevOps 8

Deployment 9

Advanced Management 9

Conclusion 10

References 11

Overview

Amazon Web Services (AWS) provides all-in-one experience for your company when working in the cloud. With services ranging from access control, storage, security, virtual machines, and more, it can be an excellent opportunity for companies. In this document we will be discussing the services that AWS provide and how they are important.

Foundation and Identity Services

Architecture

AWS is managed via a web interface, admins can use Identity and Access Management (IAM) to be able to give users access to specific services or to the platform. When working in a cloud none of the data or processing is done locally, it is done on Amazons servers. AWS is a pay-as-you-go platform, so rather than paying for the service as a whole, you are charged for the utilization, time, or traffic for each service, this can be a benefit for companies who do not have the space or infrastructure to have these machines locally.

IAM

Identity and Access Management (IAM) is a service within AWS that provides admins to create users and groups, where they can give them access to machines, addresses, control panels, and more. IAM Is the foundation of AWS, and every service will leverage it in some way, from virtual machines, and storage, IAM will allow your services to be accessed securely.

Core Infrastructure Services

EC2

Elastic Compute Cloud (EC2) is AWS version of Virtual Machines (VM), in this service you will be able to create a machine, running on a variety of operating systems, and then give users access to it, or use it to host a server. VM's are extremely powerful and can do about anything you need them to do, and thanks to Auto Scaling in AWS, you VM can expand its resources when under load.

S3

Amazon Simple Storage Service (Amazon S3) is the platform where you can store files, data, and information. S3 classifies data as "objects", and they use "buckets" to store this data. AWS Provides multiple different bucket tiers, ranging from hot to cold, where the hotter the bucket is, the more frequently it is accessed or modified. These buckets can be a great place for you to be able to store your data for an application, such as images, user forms, and more, and depending on the tier you do not need to worry about overpaying.

Data Management and Networking

RDS

Amazon Relational Database Service (RDS) provides a server to allow you to host and store database entries, using platforms such as MySQL, MariaDB, Oracle, and more. Databases store information in a table-like format, this means that there are columns and rows that are used to store the data. Databases are a critical part to almost any company, whether it be from storing employee information, events, or financial data, Amazon RDS will provide the platform for you to store and manage this data effectively.

DynamoDB

Amazon DynamoDB is an alternative to RDS, where in this case it stores data in a NoSQL format, and is fully provided by Amazon. A NoSQL database means it is no longer structured in a table format, rather it is non-relational, so items do not depend on the table for the properties within. Although this can be less efficient depending on the situation, when dealing with data that does not have a consistent structure, DynamoDB can be a wonderful platform.

VPC Networking

Amazon Virtual Private Cloud (Amazon VPC) allows you to host your own cloud service, this is done when a larger company wants to give customers or employees a dedicated platform. This replicated how companies would often create servers and websites on site to be able to allow employees to work, or customers to use their service. VPC allows you to host this cloud by leveraging on top of AWS. This results in better expandability, control, and security.

Advanced Services and Automation

Security

When working in the cloud it is inherently more secure than when hosting locally. If you were to create a server, and a database on site, and if this were publicly accessible (even with access control) it would be significantly more vulnerable than the cloud counterpart. Because your service is in the cloud, the liability of maintaining and protecting the servers is now in the hands of AWS, resulting in a larger, more established company protecting your service. Another benefit to working in the cloud is that disaster recovery is almost a thing of the past, because AWS stores your data in multiple locations, recovery times are extremely fast and efficient.

Lambda

Lambda is a term that is often used in programing, this is where simple functions are consolidated as a single line, and can be called during runtime, this optimizes efficiency and reduces the need to rely on full functions. They also allow you to better control your scope and resources in runtime. Lambda in AWS provides you to make these simple functions to oversee and manage your AWS platform, they will not exist until they are called, where they will then initialize and run the command, then disposing of the process afterwords. This means that you will not have to pay for the service being available, just for that one instance it is called.

CloudWatch

CloudWatch allows you to monitor and maintain your Cloud services, such as an EC2 instance. You can tell CloudWatch to monitor a specific service and then notify you if the service uses too many resources, takes too long, or is idle. CloudWatch is highly customizable and can even do email or push notifications, as well as notifications built within AWS. This comes with little charge unless you tell CloudWatch to act automatically based on the event.

CloudFormation

CloudFormation gives you the ability to automate tasks within AWS, such as creating a new EC2 instance. By using YAML or JSON, both Object Notation markup languages, you can create robust scripts that will interact with other AWS services, resulting in a more automated experience. You can use CloudFormation to automate creating EC2 instances, IAM users, Archiving Data, and much more.

Enterprise Operations and Management

High Availability

Because of working on the Cloud, your service will have much higher availability than if it was hosted locally. This is because of the multiple servers across the globe that AWS has, and the large infrastructure that has be built with Amazon. AWS and many other cloud services have a target uptime of around 99.99%, or higher for the year. That means there will only be 9 hours for the entire year that AWS will be down.

Scaling

Working in the Cloud means that you are no longer constrained by physical space or products, meaning if you needed to add another server, or give an existing one more resources, you can do it at a press of a button, rather than having to go out and buy new equipment, and considering the space that you already have. AWS also provides servers that allow for autoscaling, resulting in your servers or EC2 instances, receiving the necessary resources to always operate at peak efficiency. AWS also allows you to manage your entire network within the cloud, managing devices, IPs, VPNs, and more, all without the need to expand your site, albeit with a charge.

DevOps

When developing you will often choose to have at least some part of the process be in the cloud, with this being the building process, git management, or teamwork, one of these things will often be in the cloud. What AWS provides is multiple services that accomplish this, and thanks to built in git support, and integration with IAMs, your development experience will be extremely smooth. In AWS you can create a git repository, this will store your source code, and allow you to have version management, you can then validate your code and build it using actions, where AWS even supports GitHub actions.

Deployment

Thanks to AWS deploying your product is extremely easy, all the user needs to do is provide the source code, and any build instructions for the application, and AWS will automatically install the dependencies, build, and even publish your application or service. This can even be integrated with the Google Play Store, Apple App Store, or to a website. Because AWS also will have git management, you can link your repository with the deployment features, allowing for an experience where your code is stored, managed, and published all in one service.

Advanced Management

AWS has hundreds of different services and platforms available, but one I find particularly useful is their native support of GitHub actions. GitHub Actions is an extremely powerful automation tool that will allow you to validate, check security, build, and manage your repository. What AWS does is add support for GitHub Actions within its private repositories. GitHub actions are managed by a YML/YAML file that defines the configuration for the actions. It will include on events, in this case, when there is a push to the main branch, or when a branch is pulled to main, or on a specific schedule. You can then have multiple jobs that will run on this event.

Another service that is provided on AWS, is the ability to manage, and configure a firewall for your entire network, this results in you can monitor and control traffic between your devices and the internet, resulting in a more secure connection. This is certainly considered a more advanced feature, but for anyone who works on networks, they will take advantage of this to properly lock down their devices and network, while having the ability to integrate it with other AWS services such as IAM.

Conclusion

AWS is an extremely powerful, and customizable service, allowing users and companies to host their data or servers remotely, rather than having to deal with the difficulties of a local server. Although this seems like a great service, there are some downsides, these being the loss of control, and the cost. When working in the cloud you are forfeiting the responsibility and control over your services, as you no longer own them, AWS does, even if you technically own the data within it, the machine is still managed by Amazon, meaning if in the unlikely event they were to go out of business, you would lose access to your servers. AWS can also be more costly than hosting it yourself, however that really depends on the duration and the workload of the task, AWS is great for expanding, requiring little to no extra payment to expand, putting your usage rate would go up. Contrary to how with a local server regardless of the utilization, you paid once for the server, but if that server was no longer good enough, you will have to pay a lot to get a new one.

References

Access Management- AWS Identity and Access Management (IAM) - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/iam

Amazon DynamoDB. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/dynamodb

Amazon EC2 - Cloud Compute Capacity - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/ec2

Amazon S3 - Cloud Object Storage - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/s3

APM Tool - Amazon CloudWatch - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/cloudwatch

Application scaling - AWS Auto scaling - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/autoscaling

DevOps. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/devops

Managed SQL Database - Amazon Relational Database Service (RDS) - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/rds

Private Cloud - Amazon Virtual Private Cloud (VPC) - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/vpc

Serverless Function, FAAS Serverless - AWS Lambda - AWS. (n.d.). Amazon Web Services, Inc. https://aws.amazon.com/lambda