

Charles Malon Silva Rocha - 2021376

**Cloud Services**

**Implementing a proof-of-concept cloud architecture**

**Dublin**

**2024**

**CCT College Dublin**

**Assessment Cover Page**

*To be provided separately as a word doc for students to include with every submission.*

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| **Module Title:** | Cloud Services |
| **Assessment Title:** | Implementing a proof-of-concept cloud architecture |
| **Lecturer Name:** | Michael Weiss |
| **Student Full Name:** | Charles Malon Silva Rocha |
| **Student Number:** | 2021376 |
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Below you can access the progress of this assignment.

<https://github.com/CharlesMalonRocha/Cloud-Services-CA1>

**Declaration**

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| By submitting this assessment, I confirm that I have read the CCT policy on Academic Misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source. I declare it to be my own work and that all material from third parties has been appropriately referenced. I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution. |

Contents

[Introduction 4](#_Toc9032)

[TASK 1a: S3 website hosting 5](#_Toc19400)

[TASK 1b: Research Task 6](#_Toc4767)

[TASK 2a: Application Load Balancer Configuration and discussion 7](#_Toc18441)

[TASK 2b Challenge 8](#_Toc26928)

[Challenge Task 3a 9](#_Toc25591)

[Challenge Task 3b 10](#_Toc12695)

[Proposed solution to the cloud engineering manager 11](#_Toc17611)

[Conclusion 12](#_Toc13610)

[References 13](#_Toc19339)

Introduction

TASK 1a: S3 website hosting

TASK 1b: Research Task

**Amazon S3 vs. EC2 with EBS: A Detailed Analysis**

Amazon Web Services (AWS) offers a range of cloud services, and among the most popular are Amazon S3 (Simple Storage Service) and EC2 (Elastic Compute Cloud) with EBS (Elastic Block Store). Both provide storage solutions, but they serve different purposes and have distinct features, use cases, and architectures. Let's break down the differences, use cases, similarities, and references (docs.aws.amazon.com, n.d. and Amazon Web Services, 2019).

### Amazon S3: Simple Storage Service

**Overview**:  
 Amazon S3 is a scalable object storage service. It stores data as objects within buckets (similar to folders), and each object is identified by a unique key. It's optimized for storing and retrieving large volumes of unstructured data and is known for its "write-once, read-many" design (docs.aws.amazon.com, n.d.).

**Key Characteristics**:

* **Object Storage**: S3 uses an object storage model, which stores data as individual objects.
* **Global Scalability**: S3 is globally accessible, and AWS handles data replication across regions.
* **Durability and Availability**: Designed for high durability (99.999999999%, or 11 9s), meaning data is highly protected.
* **Storage Classes**: Offers various storage classes (e.g., Standard, Intelligent-Tiering, Glacier) to optimize cost based on access frequency.
* **Data Accessibility**: Primarily accessed over HTTP(s) using REST APIs, allowing easy integration with various applications.

**Use Cases**:

* **Backup and Archival**: Ideal for storing backups and archived data due to its high durability and low-cost storage options (e.g., Glacier).
* **Static Content Hosting**: Perfect for hosting images, videos, and static websites, as data can be accessed over HTTP(S).
* **Data Lakes**: S3’s scalable and cost-effective nature makes it a strong foundation for data lakes used in big data analytics.
* **Content Distribution**: Integrated with CloudFront, S3 helps distribute content globally with low latency.

### Amazon EC2 with EBS: Elastic Compute Cloud with Elastic Block Store

**Overview**:  
 Amazon EC2 provides scalable computing power in the cloud. EBS is a persistent block storage system for EC2 instances, allowing data storage in block format (like a traditional hard drive) and supporting applications that require low-latency access and high IOPS (Input/Output Operations Per Second) (Amazon Web Services, 2019).

**Key Characteristics**:

* **Block Storage**: EBS is a block storage service, meaning it works at a lower level, providing raw storage for OS-level formatting and partitioning.
* **Persistent Storage for EC2**: EBS is designed specifically for EC2 instances, providing storage that persists even after instances are stopped or restarted.
* **High-Performance and Low Latency**: EBS volumes can be optimized for high IOPS, making them suitable for databases and transactional applications.
* **Snapshottable and Backups**: Users can create snapshots of EBS volumes, which are stored in S3 and can be used for backups or replicating data across instances.

**Use Cases**:

* **Databases**: EBS is suitable for database storage (e.g., MySQL, PostgreSQL) that requires high IOPS and low-latency access.
* **Transactional Applications**: Ideal for applications needing frequent read/write access to data.
* **Big Data Processing**: EC2 with EBS can be configured for compute-heavy tasks where data needs to be processed on local storage.
* **Applications Needing Persistent Disk Storage**: EBS volumes remain even when EC2 instances are stopped, unlike instance store volumes, which are ephemeral.

### Similarities Between Amazon S3 and EC2 with EBS

* **Storage Solutions**: Both S3 and EBS provide storage services, albeit with different architectures and data models.
* **Scalability**: Both services scale according to demand, although they serve different purposes.
* **Data Durability**: AWS ensures high durability for both services, making them reliable for critical data storage.
* **Backup Capabilities**: EBS volumes can be backed up using snapshots stored in S3, and S3 can archive data to lower-cost storage classes for backup purposes.

**Differences Between Amazon S3 and EC2 with EBS**

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| **Feature** | **Amazon S3** | **Amazon EC2 with EBS** |
| Storage Model | Object Storage | Block Storage |
| Data Structure | Bucket and Object | Volumes attached to EC2 instances |
| Use Case Focus | Data lake, backup, and archive | High-performance storage for compute tasks |
| Data Access | HTTP-based (REST API) | Disk-level access through attached EC2 instances |
| Performance | Suitable for high-throughput | Optimized for low-latency, high IOPS |
| Durability | 99.999999999% (11 9s) durability | 99.9% - 99.999% availability, dependent on volume type |
| Data Persistence | Data is independent of compute | Persistent with EC2, linked to specific instances |
| Storage Classes | Multiple tiers (e.g., Glacier) | Types vary by performance and IOPS (e.g., gp3, io2) |

TASK 2a: Application Load Balancer Configuration and discussion

TASK 2b Challenge

Challenge Task 3a

Challenge Task 3b

Proposed solution to the cloud engineering manager

Conclusion

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References

docs.aws.amazon.com. (n.d.). *What is Amazon S3? - Amazon Simple Storage Service*. [online] Available at: https://docs.aws.amazon.com/AmazonS3/latest/userguide/Welcome.html#S3Features.

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Amazon Web Services (2019). What Is Amazon EC2? - Amazon Elastic Compute Cloud. [online] Amazon.com. Available at: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html.

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