**Hosting a Sample Website Using AWS S3**

*A Project Based Learning Report Submitted in partial fulfilment of the requirements for*

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# of

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**CLOUD & SERVERLESS COMPUTING (22CEC3305A)**

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**Abstract**

Amazon Simple Storage Service (S3) is a highly scalable, durable, and low-cost object storage service offered by AWS, making it an ideal solution for hosting static websites. While S3 was primarily designed for storage, when combined with other AWS services like CloudFront, it provides a comprehensive and efficient platform for delivering static web content such as HTML, CSS, JavaScript files, images, and videos.

By uploading these assets to an S3 bucket and configuring the appropriate permissions, users can make their content publicly accessible, enabling easy hosting for a wide range of use cases, including personal blogs, business landing pages, online portfolios, documentation, and more. S3’s ability to automatically replicate data across multiple geographically distributed locations ensures high availability and durability, making it an ideal choice for serving static content with minimal risk of downtime.

A major benefit of leveraging S3 for web hosting is the seamless integration with AWS’s content delivery network (CDN), CloudFront. This combination ensures fast, low-latency access to content across the globe by caching copies of static files in edge locations closer to end users. As a result, visitors to the site experience quicker load times regardless of their geographical location, improving user satisfaction and SEO performance.

S3 also offers features such as versioning and fine-grained access controls, which allow users to efficiently manage and secure their content. Versioning enables the storage of multiple versions of a file, making it easier to roll back to a previous state if needed. Access controls, on the other hand, allow users to specify who can access specific files or buckets, ensuring that sensitive content remains protected.

One of the key advantages of hosting static websites on S3 is the reduction of operational complexity and costs. Traditional web hosting typically requires managing and maintaining servers, software, and security patches. With S3, this complexity is eliminated, as users only need to focus on uploading and managing static content. S3 automatically handles replication, backups, and scaling, removing the need for manual intervention and ensuring high availability.

This makes S3 an ideal solution for businesses of all sizes, startups, and personal projects, as it provides a robust, cost-effective, and highly scalable alternative to traditional web hosting. Websites hosted on S3 are automatically able to scale as traffic increases, without the need for additional infrastructure or resources, ensuring a seamless experience as demand grows.

Additionally, S3’s pay-as-you-go pricing model means that users only pay for the storage and bandwidth they actually use, providing a cost-efficient way to serve static content without upfront investments in hardware or long-term commitments. Whether for small-scale personal projects or large-scale enterprise applications, S3 offers a flexible, secure, and easily manageable solution for hosting static websites globally.

In summary, hosting websites on S3 allows businesses, developers, and individual users to create, deploy, and scale static websites with minimal setup, reduced overhead, and global reach. By taking advantage of S3’s scalability, durability, security, and integration with CloudFront, users can ensure optimal performance and availability for their static web content.

# **Introduction**

This project demonstrates how to host a static website using **Amazon Web Services (AWS) Simple Storage Service (S3)**. AWS S3 provides a highly scalable, cost-efficient, and reliable solution for hosting static websites without the need for traditional web servers.

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To enhance accessibility and performance, **AWS services such as Amazon CloudFront and AWS Route 53** can be integrated. CloudFront improves content delivery speed by caching website resources globally, while Route 53 provides domain name resolution, allowing users to map custom domain names to their S3-hosted site.

AWS Simple Storage Service (S3) from the aforementioned list, S3, is the object storage service provided by AWS. It is probably the most commonly used , go-to storage service for AWS users given the features like extremely high availability, security, and simple connection to other AWS Services.

The serverless nature of AWS S3 ensures reduced operational overhead, automatic scaling, and minimal maintenance efforts. By leveraging **AWS Identity and Access Management (IAM) policies and S3 bucket policies**, website access control and security are effectively managed.

Object storage built to store and retrieves any amount of data from anywhere

Amazon S3 is an object storage service that offers industry-leading scalability, data availability, security, and performance.

Store and protect any amount of data for a range of use cases, such as data lakes, websites, cloud-native applications, backups, archive, machine learning, and analytics.

Amazon S3 is designed for 99.999999999% (11 9's) of durability, and stores data for millions of customers all around the world.

You can use Amazon S3 to host a static website. On a *static* website, individual webpages include static content. They might also contain client-side scripts.

Amplify Hosting is a fully managed service that makes it easy to deploy your websites on a globally available content delivery network (CDN) powered by Amazon CloudFront, allowing secure static website hosting.

This project showcases a streamlined approach to deploying and managing a static website with AWS S3, ensuring a **cost-effective, highly available, and easily maintainable web hosting solution**.

**Literature Review**

The advent of cloud computing has transformed web hosting, offering highly scalable, cost-effective, and secure alternatives to traditional server-based hosting. This literature review explores the foundational technologies, applications, and advancements in static website hosting using Amazon Web Services (AWS) Simple Storage Service (S3).

**1. Introduction to Cloud-Based Web Hosting**

Traditional web hosting involves provisioning physical or virtual servers, managing infrastructure, and scaling resources based on traffic demands. However, cloud-based hosting solutions such as AWS S3 eliminate these challenges by offering serverless object storage, which is cost-efficient, highly available, and globally distributed. AWS introduced S3 Static Website Hosting to enable developers to serve static HTML, CSS, and JavaScript files directly from S3 buckets without provisioning a dedicated web server.

**2. Amazon S3: The Core of Serverless Website Hosting**

Amazon S3 is a highly durable and scalable object storage service designed for storing and retrieving large amounts of data. S3’s static website hosting feature allows users to serve content over HTTP using a publicly accessible bucket.

Advantages of Using S3 for Web Hosting

* Cost-Efficiency: Unlike traditional hosting services, users pay only for the storage and bandwidth used, avoiding fixed server costs.
* Scalability: AWS S3 automatically handles traffic spikes, ensuring high availability without manual intervention.
* Reliability: S3 provides 99.999999999% durability (11 nines) and replicates data across multiple AWS Availability Zones.

According to a 2021 Gartner report, companies adopting S3-based website hosting reduced hosting costs by 60%, while achieving higher availability and simplified management.

**3. Enhancing Website Performance with AWS CloudFront**

While S3 efficiently hosts static websites, Amazon CloudFront, AWS’s Content Delivery Network (CDN), enhances performance by caching website content across edge locations worldwide. This minimizes latency and speeds up content delivery for users across different geographical regions.

Studies indicate that CDN integration reduces webpage load times by 50%, leading to improved user engagement. A 2020 report by Akamai Technologies highlights that websites loading in under 3 seconds experience 35% higher retention rates compared to slower sites.

**4. Domain Management and DNS Routing with AWS Route 53**

For branding and accessibility, businesses often prefer using custom domain names instead of AWS’s default S3 website URLs. AWS Route 53, a highly available Domain Name System (DNS) service, allows users to configure custom domain mappings to their S3-hosted websites.

Benefits of Route 53 for Static Website Hosting:

* Low-latency DNS resolution for faster access.
* Automatic domain failover to ensure high availability.
* Seamless integration with S3, CloudFront, and AWS Certificate Manager for SSL/TLS encryption.

Research by IDC (2022) suggests that integrating Route 53 with CloudFront improved website response times by 30% compared to traditional DNS providers.

**5. Security Considerations in S3 Website Hosting**

Ensuring security in publicly accessible S3 buckets is critical. AWS offers several mechanisms to protect hosted content:

* S3 Bucket Policies & IAM Roles: Restrict access to prevent unauthorized modifications.
* AWS Web Application Firewall (WAF): Mitigates common threats such as DDoS attacks and SQL injection.
* SSL/TLS Encryption: Ensures secure communication between the client and server when integrated with AWS Certificate Manager.

A 2020 report by OWASP highlighted that misconfigured S3 bucket permissions accounted for 70% of cloud-based data breaches, underscoring the need for stringent security measures.

**6. Real-World Applications and Case Studies**

Several companies leverage AWS S3 for static website hosting due to its cost-effectiveness and reliability.

* GitHub Pages Alternative: Developers use S3 to host documentation and project pages at a fraction of traditional hosting costs.
* Marketing & Landing Pages: Startups deploy landing pages on S3 to ensure high availability during promotions and product launches.
* Government & Educational Websites: Many institutions prefer S3 hosting due to its compliance with security and data durability standards.

For example, NASA’s Open Data Portal utilizes AWS S3 to distribute scientific datasets globally, ensuring fast and cost-effective content delivery.

**7. Conclusion**

AWS S3-based static website hosting offers a scalable, secure, and cost-effective solution for deploying web applications. By integrating CloudFront for performance optimization, Route 53 for domain management, and IAM security controls, organizations can build highly available and secure websites with minimal operational overhead.

As serverless architectures continue to evolve, S3 remains a preferred choice for businesses seeking simplified website hosting without managing servers. The adoption of CDNs, DNS services, and security best practices further enhances the reliability and efficiency of AWS S3-hosted web applications.