Luminus Technical University College (LTUC)

Abdul Aziz Al Ghurair School of Advanced Computing (ASAC)

AWS-Cloud Computing

Media Hosting Solution on AWS

Instructor: Omar Al-Amad

Done By:

Mohannad Yaseen
Kareem Hijjawi
Mohannad Barakat

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Introduction

This documentation provides insights into our Media Hosting Solution on Amazon Web Services (AWS). Our project is crafted to host videos and media seamlessly, accommodating users on both mobile and web browsers. Through the utilization of AWS resources, we establish a reliable, scalable, and highly available solution, ensuring a robust user experience.

Objectives

Our aim is to design a solution that meets the requirements of the project and make it accessible from web browsers in addition to mobile devices, taking into consideration the most important factors which are: authentication and authorization, availability, scalability, security, data durability, and fast accessibility.

Design Architecture

This Architecture shows the design of the solution:

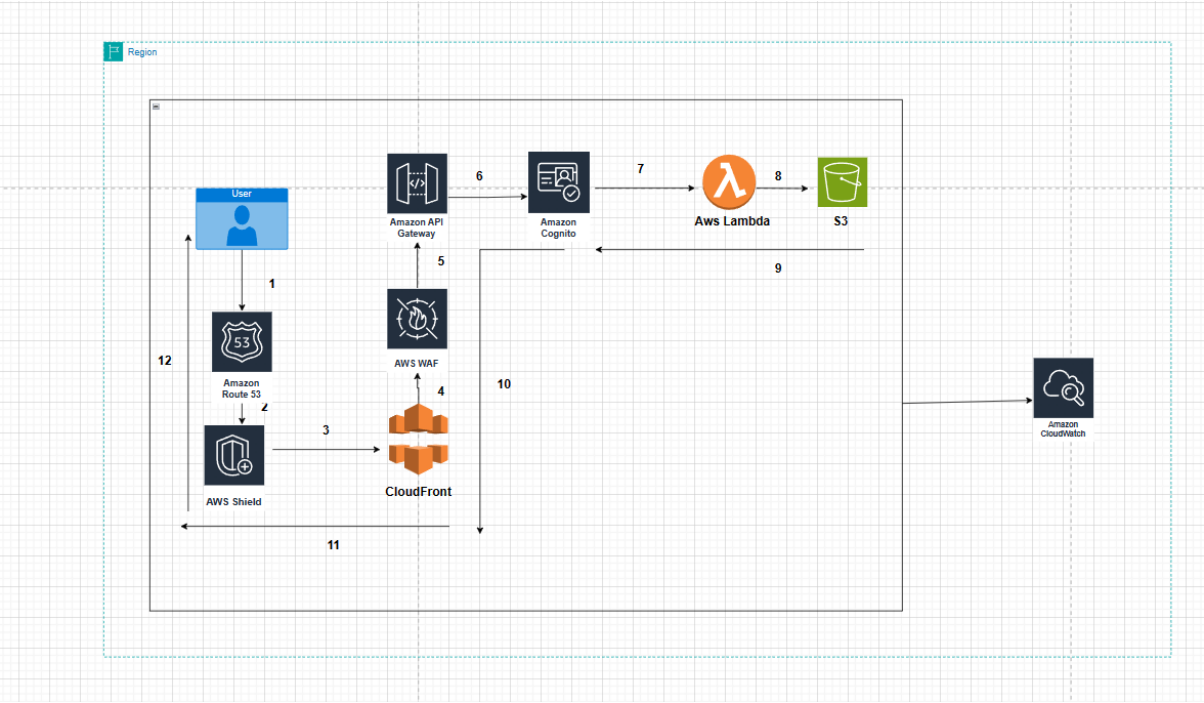

Figure 1 AWS Media Hosting Solution

Architecture and Request Flow

Our solution follows a robust architecture to ensure reliability, scalability, and security. The request flow is as follows:

1. **User Access**:
    - Users access the application through the registered domain, which is managed by Route 53.
    - Route 53 routes the request to the CloudFront distribution.
2. **CDN Optimization**:
    - CloudFront, acting as a CDN, optimizes content delivery by serving cached content from edge locations.
    - Requests for uncached content are forwarded to the designated origin, primarily the S3 bucket.
3. **Security Measures**:
    - AWS Shield provides DDoS protection, ensuring the availability of the application during potential attacks.
    - WAF filters and protects against common web exploits.
4. **Authentication and Authorization**:
    - Cognito manages user authentication and authorization seamlessly.
    - Authenticated users have access to protected resources.
5. **API Interactions**:
    - API Gateway manages API endpoints, facilitating efficient interactions for media content retrieval and other functionalities. It also makes the design accessible from web browsers and mobiles.
6. **Serverless Compute**:
    - Lambda functions are triggered as needed, handling specific tasks such as user authentication and media processing.
7. **Media Storage**:
    - The S3 bucket stores media content, ensuring scalability and durability.
    - Versioning is enabled to maintain data durability and allow recovery from accidental deletions or modifications.
8. **Monitoring and Analytics**:
    - CloudWatch monitors various metrics, set up alarms, and collects logs for comprehensive analytics.

- Insights into the application's performance are gathered for proactive management.

Meeting the requirements

1. **Authentication and Authorization**

Implementation: Amazon Cognito

Our solution leverages Amazon Cognito for user authentication and authorization. Cognito provides a secure and scalable user management system, allowing users to sign up, sign in, and manage their identities seamlessly.

2. **Availability**

Implementation: AWS CloudFront, AWS Shield, and Route 53

- **AWS CloudFront:** Acts as a Content Delivery Network (CDN) to optimize content delivery globally, reducing latency for end-users.
- **AWS Shield:** Provides DDoS protection, ensuring the availability of the application even during potential attacks.
- **Route 53:** Manages domain registration and DNS routing, ensuring reliable and scalable access to the application.

3. **Scalability**

Implementation: AWS Lambda, Amazon S3, API Gateway, and Route 53

- **AWS Lambda:** Used for serverless computing, allowing the system to scale efficiently based on demand.
- **Amazon S3:** Provides scalable and durable storage for media content.
- **API Gateway:** Manages API endpoints, ensuring efficient API interactions and scalability.
- **Route 53:** Facilitates scalable and reliable DNS routing for the application.

4. **Security**

Implementation: AWS WAF, HTTPS with CloudFront

- **AWS WAF:** Offers web application firewall protection, safeguarding against common web exploits.
- **HTTPS with CloudFront:** Enforces secure communication, ensuring data integrity and privacy.

5. **Data Durability**

Implementation: Amazon S3 with Versioning

- **Amazon S3 with Versioning:** Ensures data durability for stored media content, allowing recovery from accidental deletions or modifications.

6. **Fast Accessibility**

Implementation: AWS CloudFront and Route 53

- **AWS CloudFront:** Acts as a CDN, accelerating content delivery and optimizing accessibility for end-users.
- **Route 53:** Facilitates fast and reliable DNS resolution, ensuring efficient routing for end-users.

7. **Monitoring and Analytics**

Implementation: AWS CloudWatch

- **AWS CloudWatch:** Integrated for comprehensive monitoring and analytics, providing insights into the application's performance and health.

Resources Details

In this section, each resource selection and usage is explained briefly:

Amazon Cognito

Amazon Cognito is configured with user pools for managing user identities, sign-up, and sign-in processes. User roles and policies are defined for fine-grained access control.

AWS CloudFront

AWS CloudFront is configured with caching strategies to optimize content delivery. Origins are set up to pull content from the Amazon S3 bucket.

AWS Shield

AWS Shield Standard is enabled to provide automatic DDoS protection, defending against common attacks.

AWS Lambda

AWS Lambda functions are implemented for specific tasks, such as handling user authentication and processing media-related tasks.

Amazon S3

Amazon S3 buckets are set up to store media content. Versioning is enabled to ensure data durability, and appropriate access controls are configured.

API Gateway

API Gateway is configured with RESTful APIs to manage endpoints for accessing media content and other functionalities.

AWS WAF

AWS WAF is configured with web ACLs to define rules for protecting against common web exploits, providing an additional layer of security.

AWS CloudWatch

AWS CloudWatch is configured to monitor various metrics, set up alarms, and collect logs for comprehensive analytics.

Security Considerations

In addition to the implemented security features, ongoing security considerations include regular audits, reviews of IAM policies, and staying updated on AWS security best practices.

Scalability Measures

To ensure scalability, we monitor Lambda function invocations, S3 storage usage, API Gateway performance, and utilize Route 53's scalable DNS routing capabilities.

Monitoring and Logging

AWS CloudWatch is configured to collect and analyze logs, set up custom dashboards, and trigger alarms for critical events. Lambda and API Gateway logs provide detailed insights into system behavior.

Data Management

Regular backups of the S3 bucket are performed, and versioning ensures data durability. Data retention policies are established for CloudWatch Logs.

Conclusion

This documentation provides a comprehensive overview of our AWS Video Hosting Solution, covering authentication, availability, scalability, security, data durability, fast accessibility, and monitoring aspects. Regular updates and improvements will be made based on evolving requirements.