

## PROJECT OVERVIEW

Our client required a robust, scalable, and secure Learning Management System (LMS) to cater to thousands of students worldwide. The platform needed to integrate a payment gateway, handle proprietary content securely, and ensure minimal data egress costs on the cloud. The solution had to be fully hosted on AWS cloud, leveraging its extensive ecosystem of services to ensure scalability, security, and efficiency.



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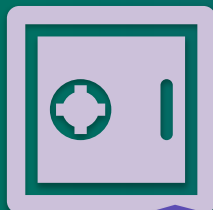
## CHALLENGES



## KEY FEATURES



Scale: Support several thousand users 24/7



Security - Safeguard Proprietary Content



Costs: Optimize data egress costs



Right Sizing: Load Test and optimize sizing

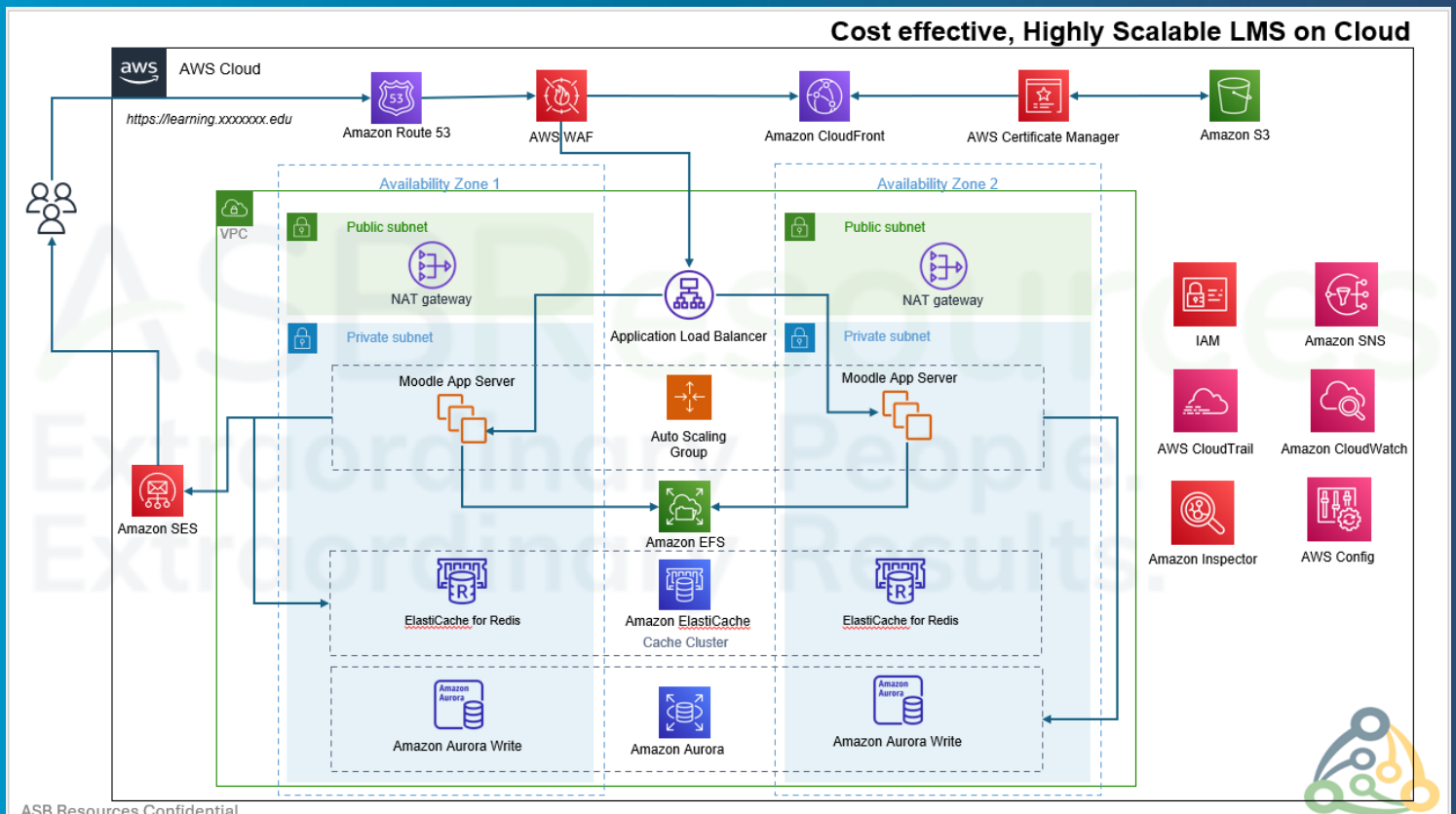


High Performance for Global Audience

# OUR SOLUTION

## Architecture Overview

- We leveraged AWS's comprehensive suite of services to build a highly scalable and secure LMS platform. The architecture is designed to be highly available, fault-tolerant, and secure, with the following key components:
  - **Amazon VPC:** Provides a secure and isolated network environment for the LMS platform.
  - **Amazon EC2 with Auto Scaling:** Elastic Compute Cloud (EC2) instances are used to host the Moodle application, with Auto Scaling groups to automatically adjust capacity based on demand.
  - **Amazon Aurora:** A fully managed relational database service that is compatible with MySQL, providing high performance and scalability for the LMS data.
  - **Amazon ElastiCache:** In-memory caching to improve performance and reduce database load.
  - **Amazon EFS:** Elastic File System for scalable and reliable file storage, used for Moodle's file system needs.
  - **Amazon CloudFront:** Content Delivery Network (CDN) to cache and deliver content efficiently to users worldwide.
  - **Amazon Route 53:** DNS service for managing domain routing and DNS failover.
  - **Amazon ACM:** Certificate Manager for managing SSL/TLS certificates, ensuring secure communication.
  - **AWS CloudFormation:** Used to automate the deployment of the infrastructure, ensuring consistency across environments.



## OUR SOLUTION Contd.

### Load Testing and Optimization

- To ensure the platform could handle the expected load, we conducted load testing using Moodle's native JMeter test plans. We set up a replica of the production environment using CloudFormation templates, ran load tests on separate EC2 instances, and analyzed the results to right-size the instances and optimize costs.

### Cost Optimization

- **Right Sizing:** We used Amazon CloudWatch and AWS Cost Explorer to monitor usage and adjust instance types and sizes to match workload requirements, minimizing costs.
- **Reserved Instances and Savings Plans:** Once the platform reached a steady state, we implemented Reserved Instances and Savings Plans to achieve up to 48% cost savings compared to on-demand pricing.

## OUR SOLUTION

- **Platform:** Moodle (Open-source LMS)
- **Infrastructure:** AWS VPC, EC2, Auto Scaling, Aurora, ElastiCache, EFS, CloudFront, Route 53, ACM, SES, SNS
- **Deployment:** AWS CloudFormation
- **Load Testing:** JMeter on Amazon EC2
- **Payment Gateway:** Stripe

## KEY OUTCOMES

- **Cost Efficiency:** Achieved up to 48% cost savings with AWS Savings Plans, optimizing infrastructure costs.
- **Data Egress Cost Reduction:** Implemented CloudFront CDN tier pricing, resulting in significant reductions in data egress costs.
- **Right Sizing:** Up to 24%% reduction in cost of running idle compute resources during lean hours of the day by enabling monitoring tools and automation
- **User Satisfaction:** Enhanced user satisfaction with a 30% improvement in CSAT scores, reflecting a superior learning experience.
- **Security Assurance:** Strengthened security posture by adhering to industry-

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