3D E-Commerce Platform Architecture on AWS

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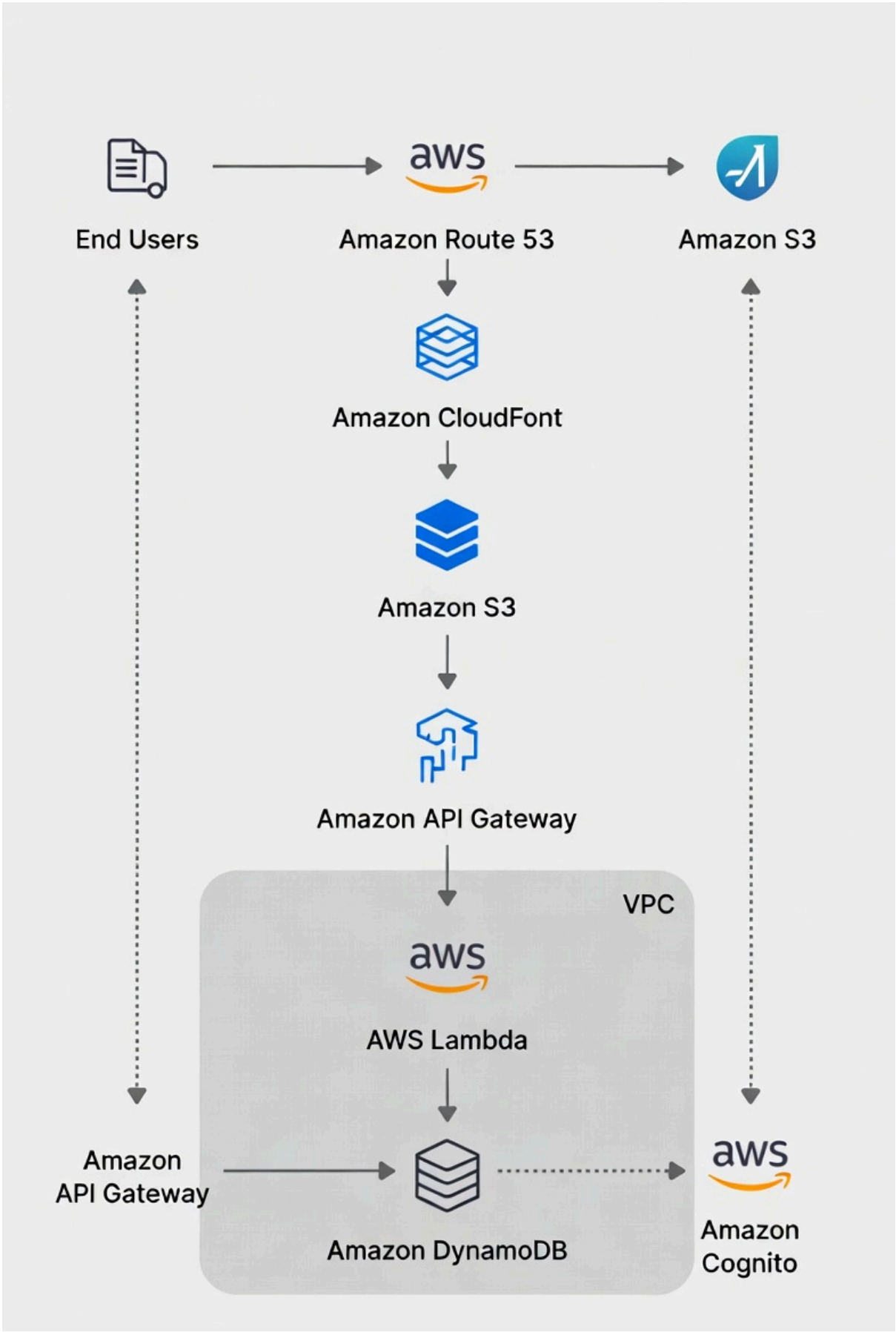
Project: Design a 3D Architecture

This document presents a scalable, highly available, secure, and cost-optimized cloud architecture for a global 3D e-commerce platform leveraging AWS services.

Executive Summary

The proposed AWS architecture enables a next-generation 3D e-commerce platform to serve millions of global users with high performance and resilience. By leveraging managed services such as Amazon S3, CloudFront, EC2 Auto Scaling, Lambda, RDS Multi-AZ, and DynamoDB, the solution ensures fault tolerance, elastic scalability, and operational efficiency. Security best practices including IAM, encryption, and network isolation is integrated throughout the design. Cost optimization is achieved through auto-scaling, serverless compute, and proactive monitoring using CloudWatch and Trusted Advisor.

Architecture Diagram


End Users
Amazon Route 53
Amazon S3
Amazon CloudFont
Amazon S3
Amazon API Gateway
VPC
AWS Lambda
Amazon
API Gateway
Amazon DynamoDB
Amazon
Cognito

Architecture Design & Service Justification

• Amazon S3 provides highly durable storage for large 3D models and static assets.

• CloudFront reduces global latency through edge caching.

• Elastic Load Balancer distributes traffic for high availability.

• EC2 Auto Scaling dynamically adjusts compute capacity.

• AWS Lambda provides serverless API scalability.

• RDS Multi-AZ ensures database failover capability.

• DynamoDB offers millisecond performance at scale.

• CloudWatch and Trusted Advisor monitor performance and optimize costs.

Meeting the Five Key Requirements

• High Availability through Multi-AZ deployment and Load Balancing.
• Scalability via Auto Scaling Groups and serverless architecture.
• Performance optimization using CDN and high-speed databases.
• Security enforced with IAM, encryption, and controlled network access.
• Cost Optimization through right-sizing, monitoring, and automation.

Design Trade-offs

The architecture balances control and cost efficiency. EC2 offers flexibility but requires management, whereas Lambda simplifies operations with execution limits. RDS provides structured consistency, while DynamoDB excels in scalability. Optimizing 3D assets through compression and caching remains critical for performance.