



PUBLIC SECTOR
SUMMIT ONLINE

Building reliable and secure online education applications

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Today's speaker



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I head the Cloud business at MIND. I'm a Principal Architect for Enterprise & Mobile Applications portfolio. I have vast experience handling a variety of complex enterprise projects/migrations across technology platforms.



Agenda

Application background and need

Old architecture

AWS services used

New architecture and distributed load testing

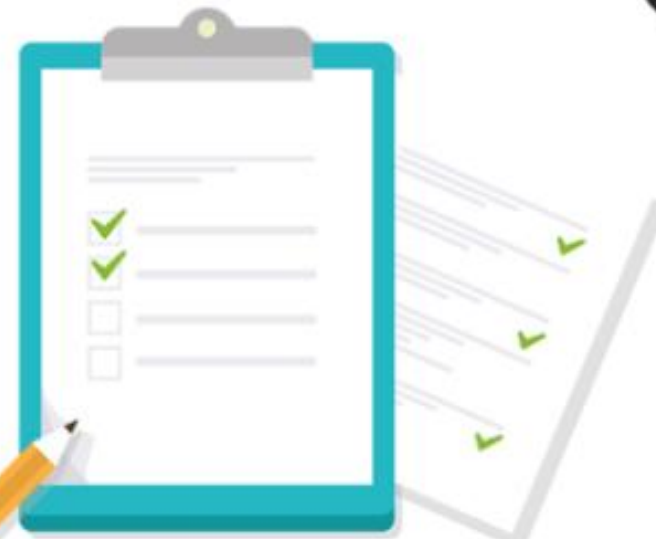
DevOps and anomaly detection

Reducing cost of failure and cost of experimentation

Application background and need

Fast growing digital education portal

HOW TO
HANDLE
YOUR SCHOOL
EXAMS DURING
AND AFTER
COVID-19 ?



Critical business requirement



10M student: Student will join from state board and private school

60K school: Including state board and private school from all over India will join

3 states: Currently this application will be live for three states and few private schools

Key challenges

Scalability and reliability

Multi-school support from multiple state

Cost sensitivity

Delivery method

Desktop/laptop:

Through web portal

Mobile:

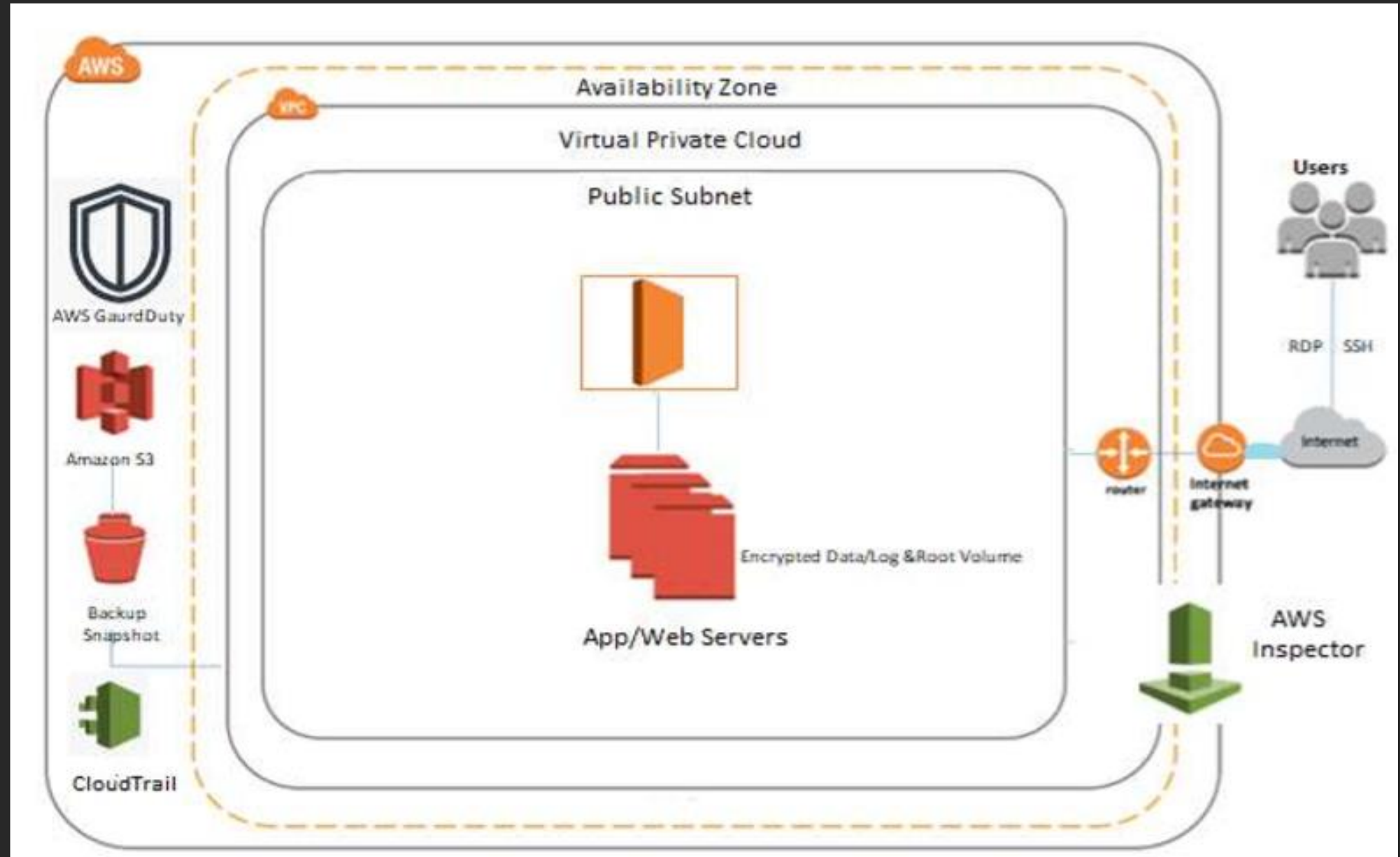
Wide reach of mobile applications made it easy to reach more students even in the rural areas



Old architecture

Typical monolithic architecture

TUK application architecture was based on typical monolithic style with single point of failure



Modernization

AWS services used for scalable infrastructure



AWS Application Load Balancer (ALB): Host based and path based routing is implemented for delivering request to respective web and mobile app servers. Load balancers also assist distributing the load on multiple servers.



Amazon S3: To reduce load on application servers, all static content and user uploaded content was moved to Amazon S3, a low cost object storage service.



CloudFront: Since a significant part of content delivered to end users was cacheable and users from multiple locations, CloudFront was introduced, which not only improved performance, but also further helped in cost optimization. This also helped in additional protection against DDoS attacks.



Amazon Autoscaling Group (ASG): For TUK assessment autoscaling was implemented to provide best performance and keeping cost under control as well. Simple scaling policies, implemented based on CPU Utilization is used. Monitoring Alerts are set for TUK web and Mobile App autoscaling group.

AWS services used for scalable infrastructure

Aurora MySQL Amazon RDS:

Recommended to cater the dynamic workload and reduce architectural complexity.

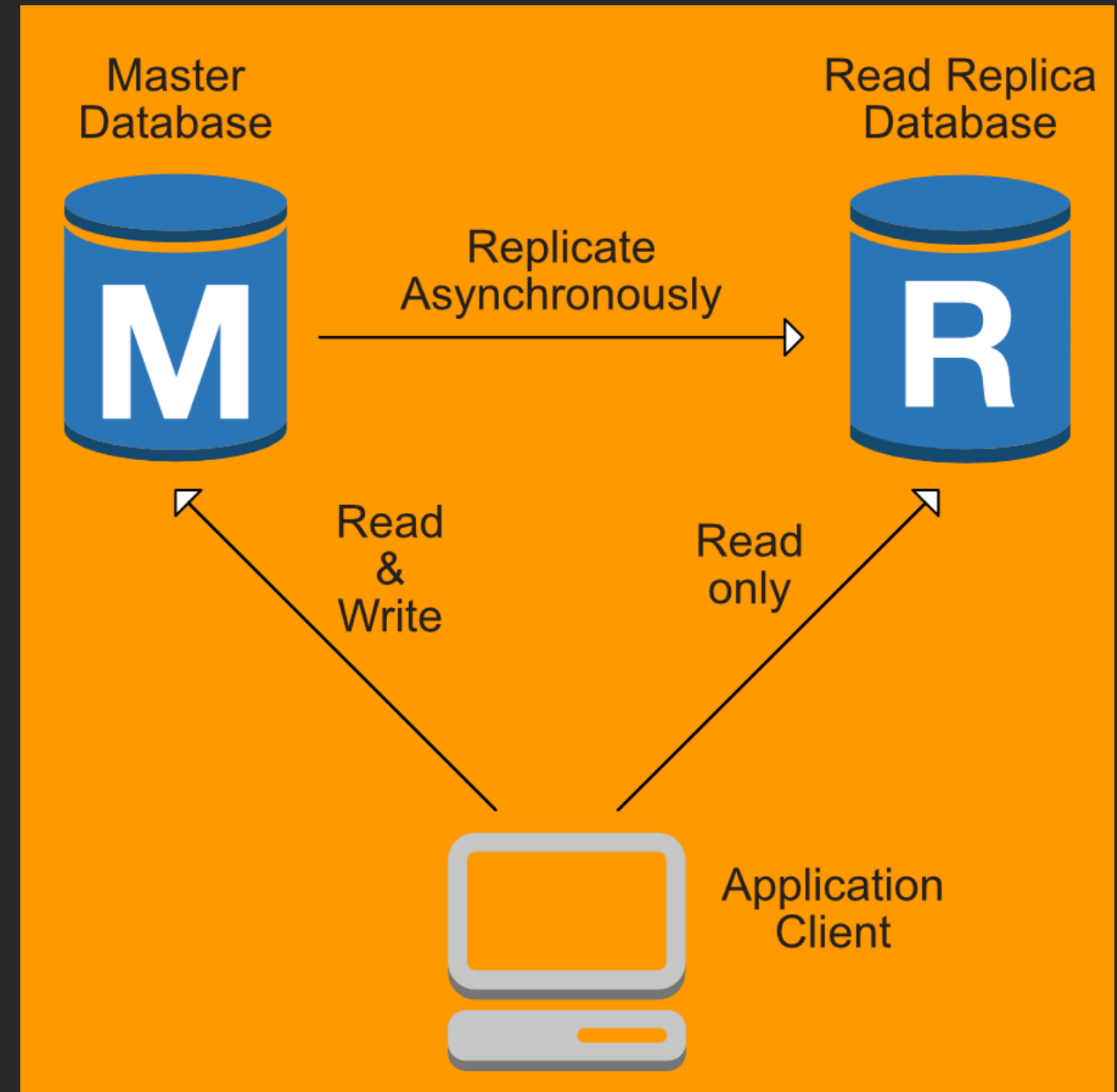
TUK achieved following benefits by using it

Simpler

Scalable

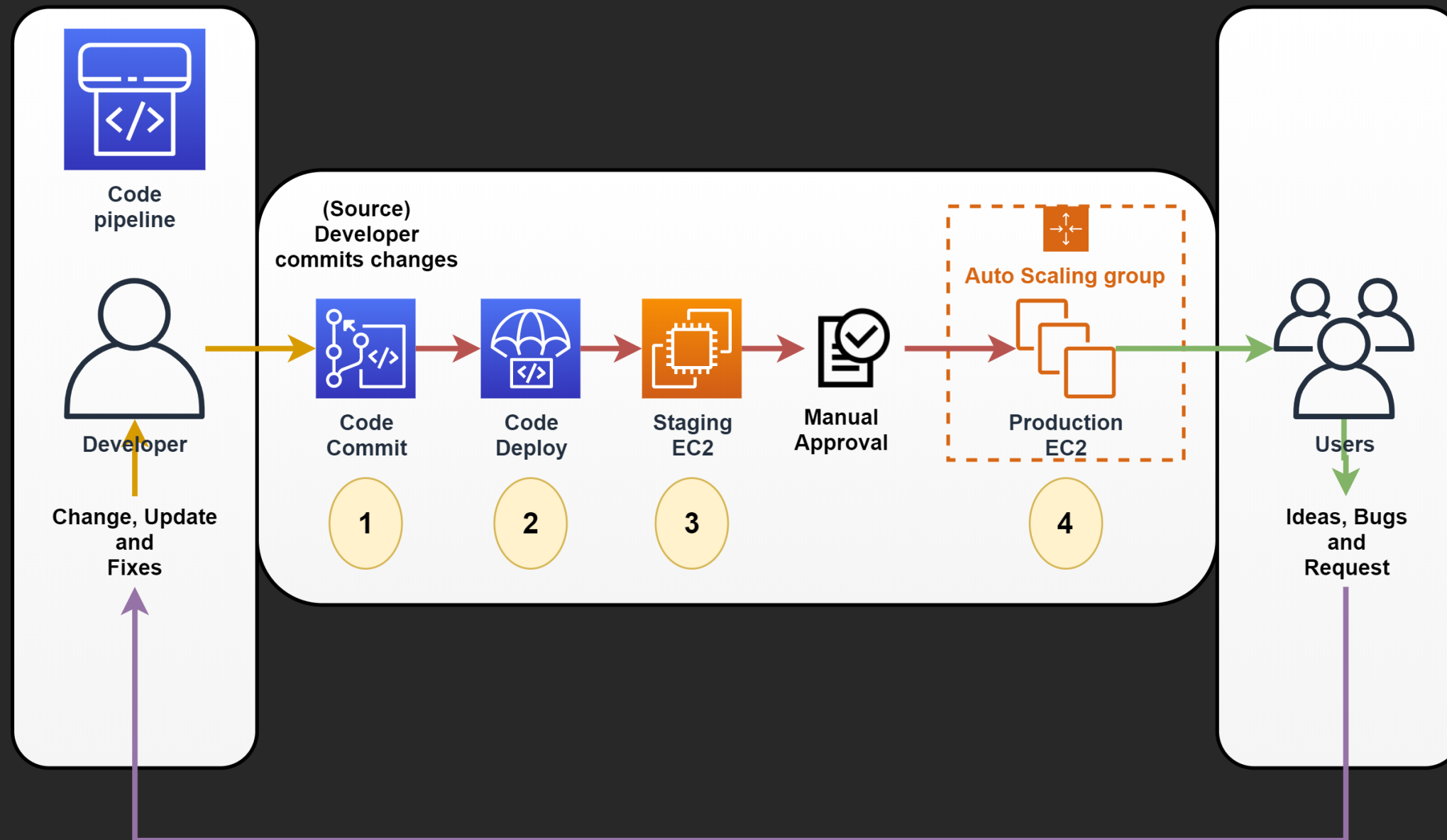
Cost-effective

Highly available storage



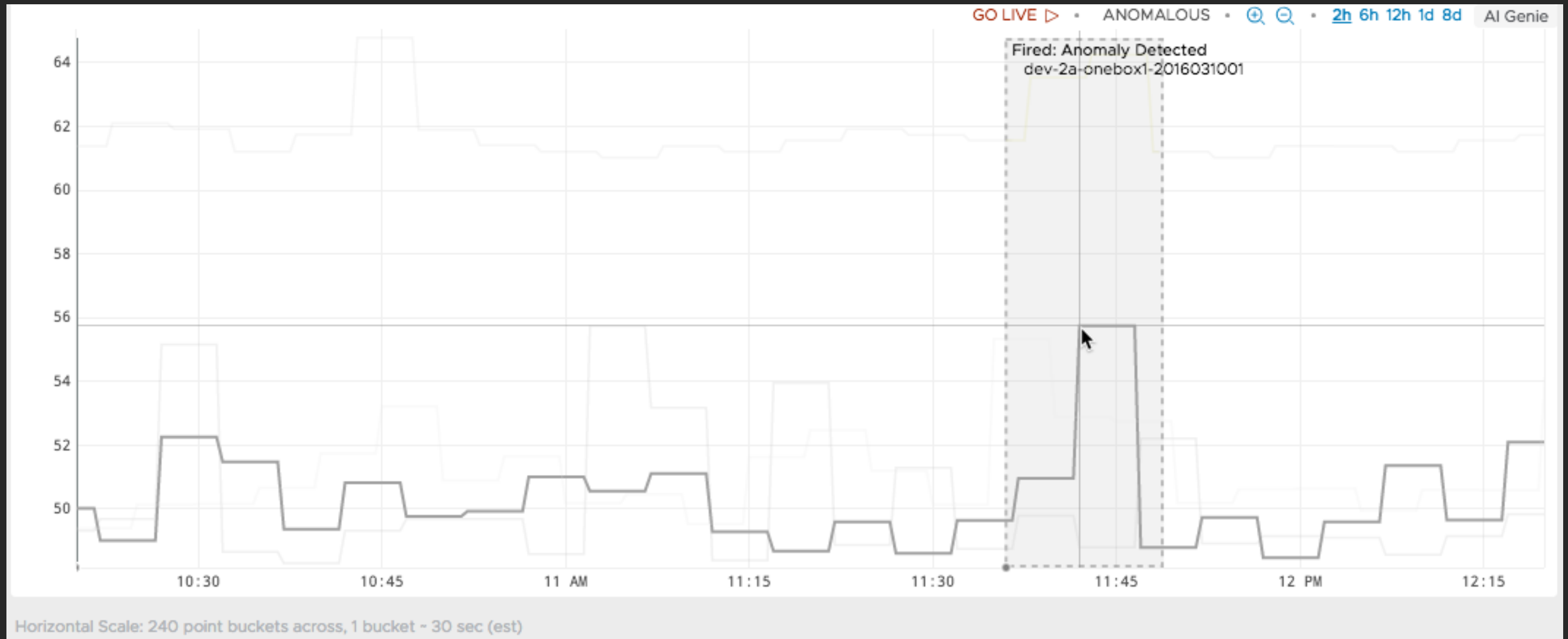
DevOps

Benefits: The benefits realized as a result of our implementation included no CI/CD server needed and low cost for CodePipeline; no server maintenance; human effort is eliminated; and reduced time to deploy code changes



Anomaly detection for high reliability

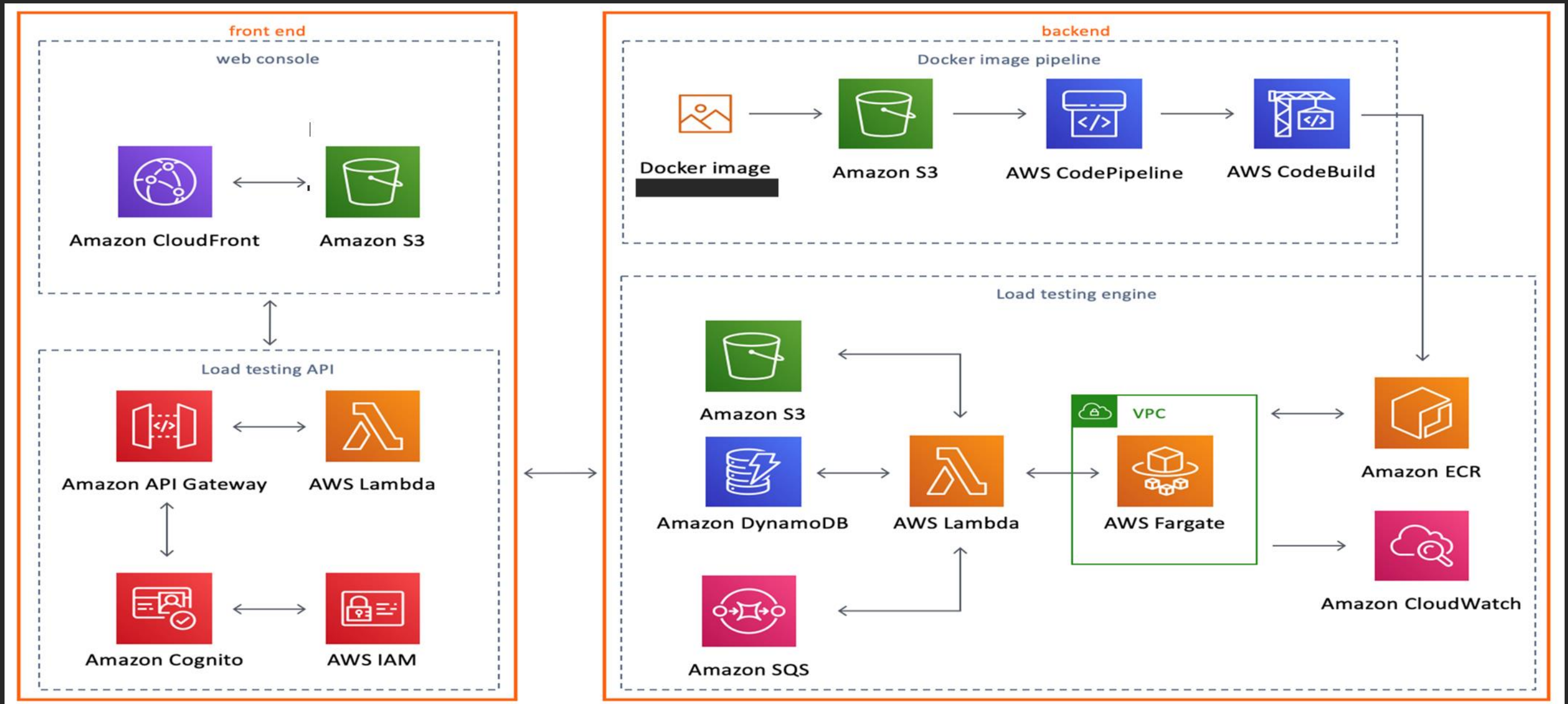
Forecasting and Anomaly Detection with AI Genie | Wavefront :



Distributed load testing

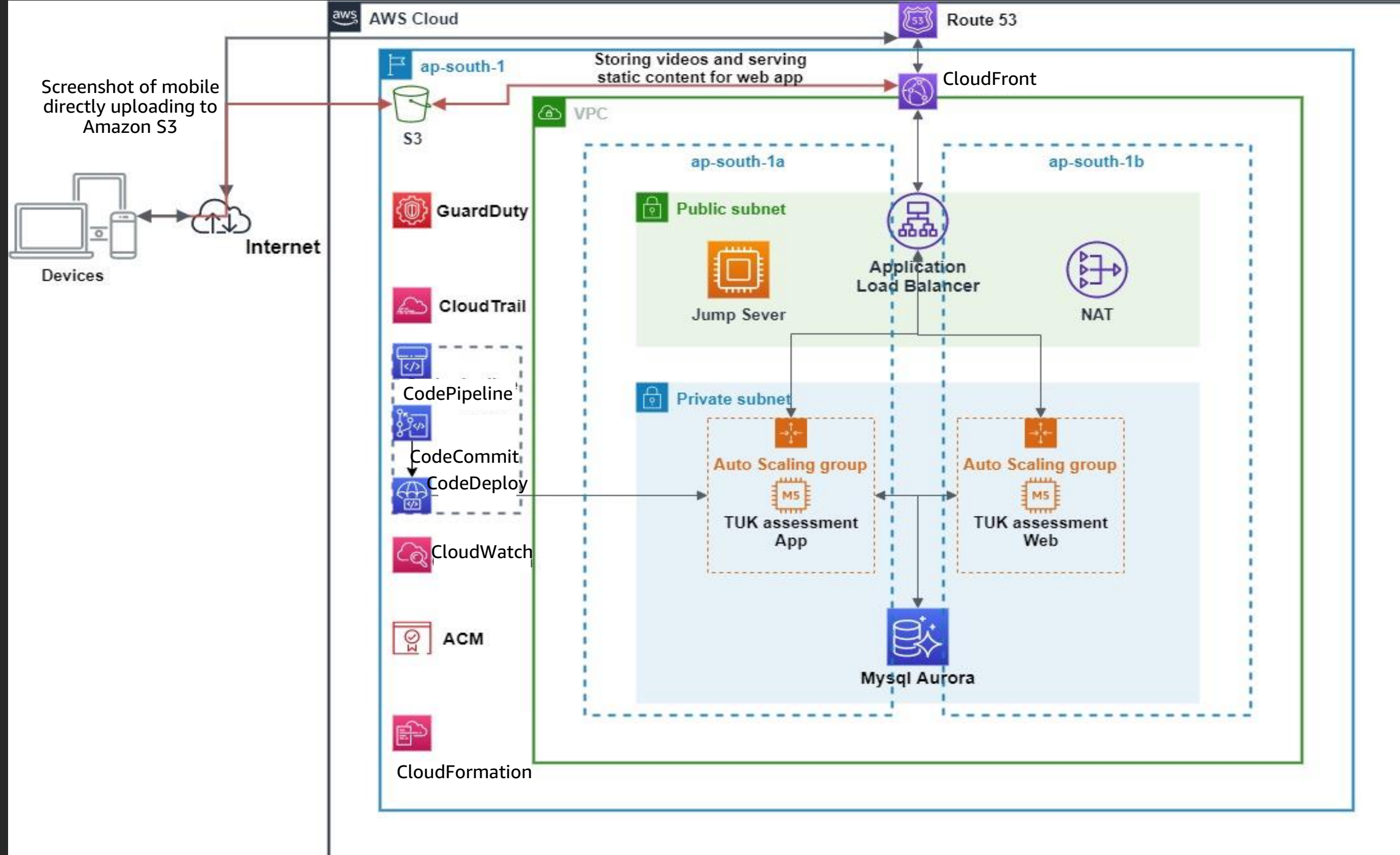
Distributed load testing

Master-Slave load testing using Amazon EC2 spot instances: We know that our load test will take less than an hour. When it comes to the master-slave setup of load testing, we might be needing 5-10 slave servers to perform an efficient load test. This problem solved by using the spot instances which save 60-70% of cost



New Architecture

Architecture – web and mobile



Cost of failure and experimentation

Reducing cost of failure

Design for failure to reduce cost of failure

DevOps

Log aggregation and insights

Immutable deployment

With fast failure detection, microservices based architecture and automation, cost of failure drastically reduced at the same time improving customer confidence

Microservices

Easy separation of responsibilities

Low cost backup and DR

High availability

Automation

Easy forensics

Reducing cost of experimentation/change

An agile solution need to be adapt fast to change

AWS helps in adapting to change with host of services

Flexibility of services

Multiple pricing options

Templatization for automation

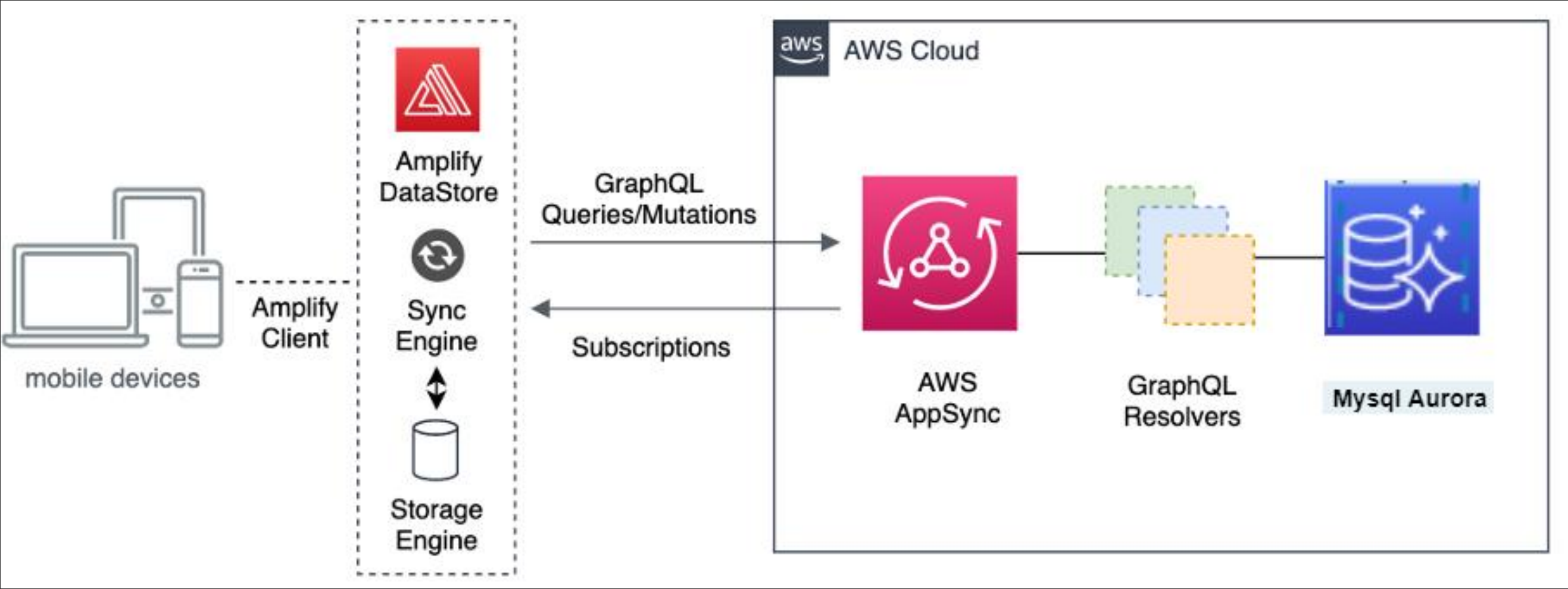
Split traffic

Governance controls

Reference Architectures

What next?

Proposed Architecture using AWS Amplify & AppSync



Benefits of using Amplify and AWS AppSync

Analytics: With the effective analytics feature, Amplify helped the TUK (customer) to identify the behavior and interest of their application users with ease. These insights were proved to be very useful for designing data driven marketing strategies and business decision making.

Data Store: It helped the TUK development team by offering a familiar and local first programming model, with conflict detection, automatic versioning, and resolution in the cloud.

Push notifications: It helped TUK in leveraging customer insights and targeting potential customers in a more effective way. They were able to tailor their content and communicate via different channels including texts, email, and push notifications.

Storage: Amplify helped TUK in managing and storing user-generated content including videos, audios, images, etc. in the cloud in a secured manner. It's built-in Amazon S3 support helped them leveraging cloud scale storage effectively.

Thank you!

Tarun Gupta