ECE 528 Project Abstract

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Project Title:
Cloud-based Bookstore system

Abstract:

The primary focus of the project will be the introduction and configuration of an online bookstore system that makes use of cloud computing to provide an application that is both highly available and easily scalable. We will develop a complete web application that presents CRUD (Create, Read, Update, Delete) capabilities by leveraging Spring Boot on the back end and React for the front-end user interface. The system aims to facilitate easier online book browsing, purchasing, and the management process.

The release of the application will take place on Amazon Web Services (AWS), using multiple cloud services for optimal operation. We plan to use AWS Relational Database Service (RDS) to both manage and store book data alongside user information. To keep traffic balance and achieve high availability, we plan to use an Application Load Balancer (ALB) to distribute traffic across EC2 instances deployed in diverse regions. Also, an S3 bucket will feature the holding and delivery of the front-end React application to provide swift and secure static resource access.

Such an architecture will permit efficient scalability and deliver both high availability and low latency for users internationally. By taking advantage of current cloud services, this initiative will provide proof of concept for a solid, full-stack bookstore system that is trustworthy, adjustable, and pleasing for users.

Motivation and Problem Statement:
Our reason for choosing the development of an Online Bookstore System on cloud infrastructure comes from the booming demand for e-commerce platforms that are scalable, high-performing, and accessible around the world. The value in resolving this issue rests in ensuring users have a smooth, fast, and dependable shopping journey, regardless of where they are. Our solution will assure high availability, low latency, and efficient resource management, even in the face of traffic spikes by utilizing cloud infrastructure—specifically services including EC2, RDS, S3, and ALB from AWS. Notably, this is important for sustaining customer satisfaction, cutting downtime, and making a platform accessible globally.

Proposed Solution:
Our online bookstore system will be developed with React on the front end and Spring Boot on the back end, and it will be hosted on AWS for high availability and scalability. We will be using:

- AWS EC2 instances
- AWS RDS for database management.
- Traffic distribution using an application load balancer (ALB).
- To store and serve the front end, use AWS S3.

This cloud architecture addresses the issues of scalability and reliability while guaranteeing low latency, high availability, and smooth performance for users globally.

Expected Challenges:

- **Load Balancing and Traffic Management:** Effective configuration of the Application Load Balancer (ALB) to appropriately route traffic between regions and overcome peak loads with no changes in performance.
- **Security Management:** Protecting sensitive data for users and transactions scattered across a variety of services (RDS, S3, EC2) and conforming to data protection laws
- **Deployment and Integration:** Integrating a variety of AWS services with deployment pipelines for both front and back components, without disruptions.
- **Cost Optimization:** Managing cloud resources in such a way as to reduce operational costs and still maintain outstanding performance and availability.

References:
https://docs.aws.amazon.com/elasticloadbalancing
https://docs.aws.amazon.com/rds
https://aws.amazon.com/architecture/well-architected/