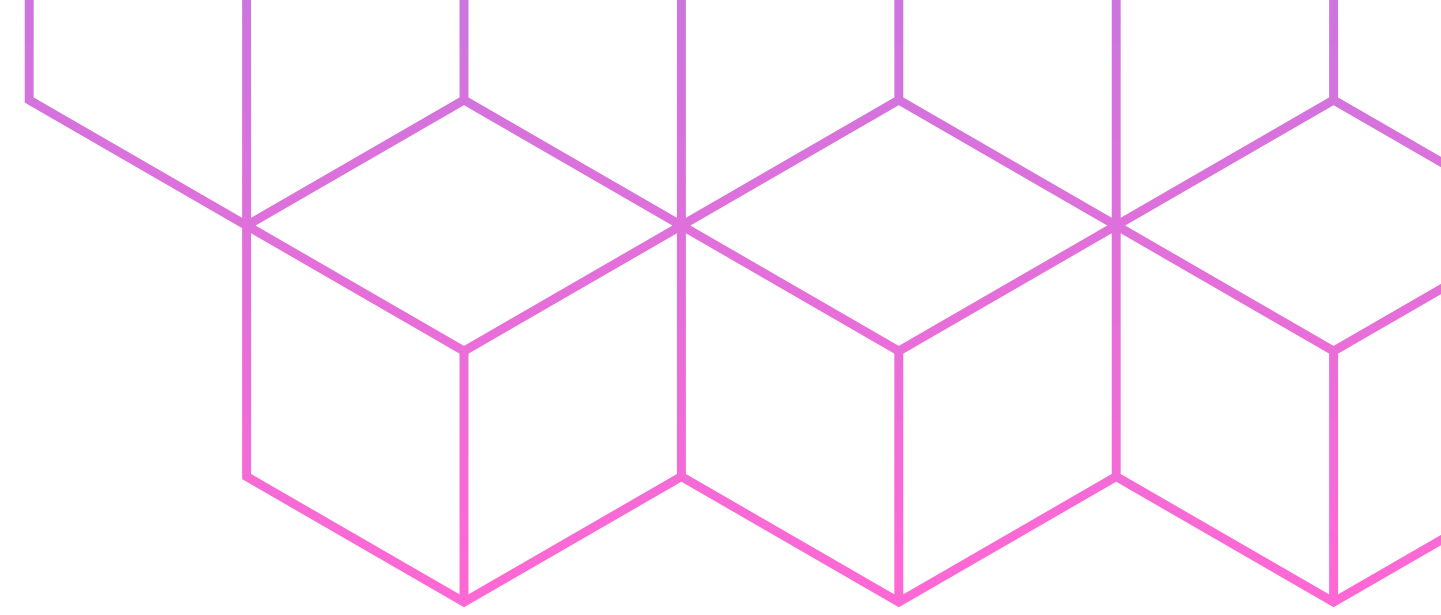




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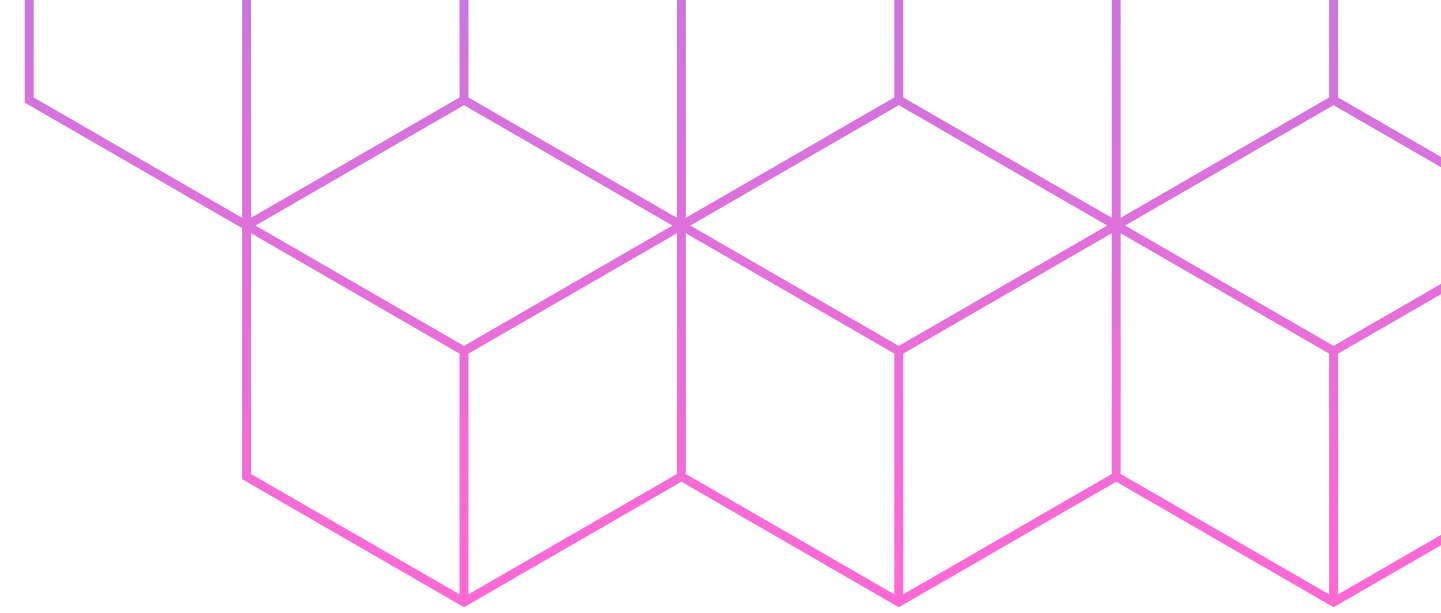


AWS EKS with CICD

Case Studies - 2

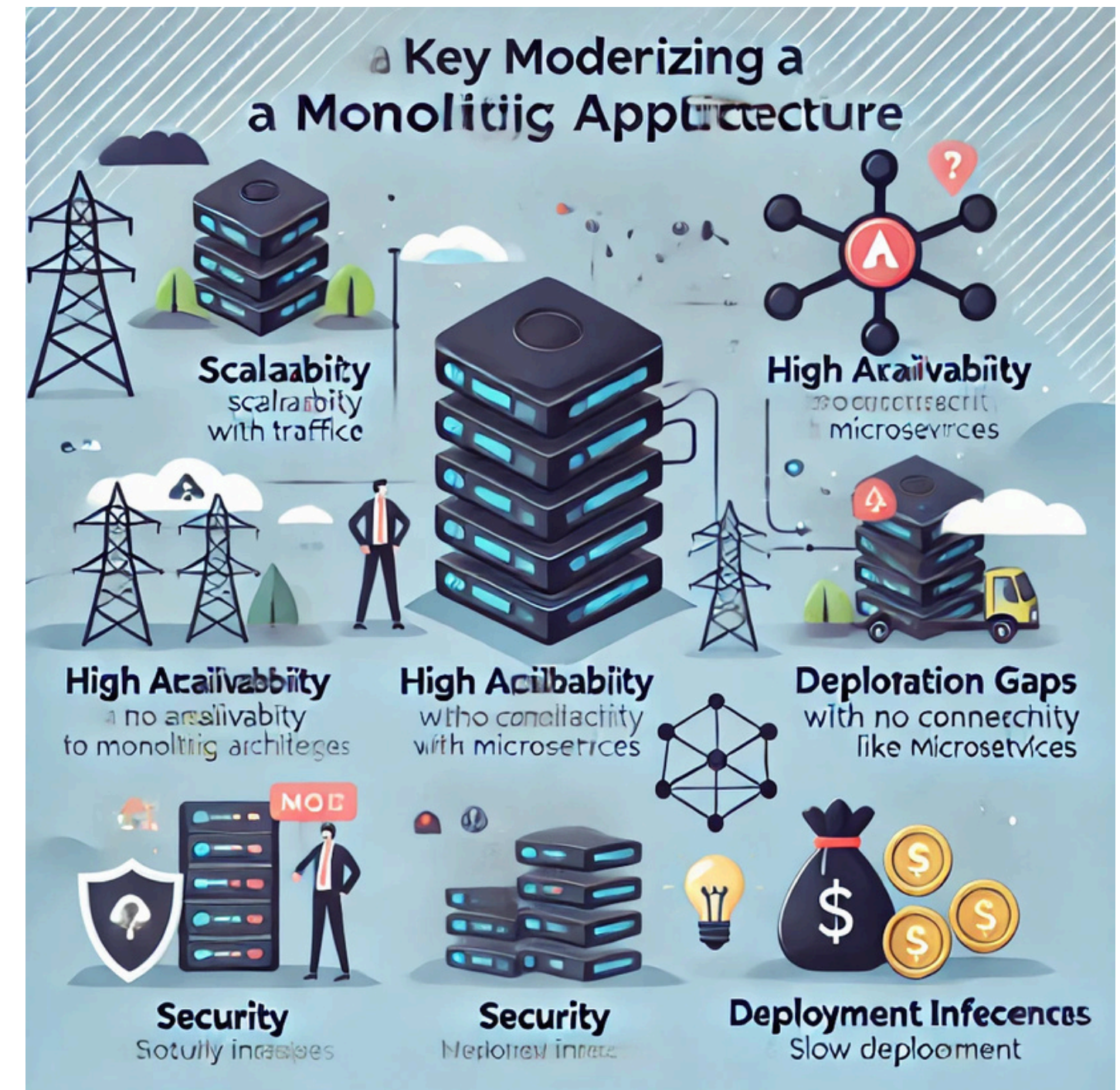
Introduction

Our client sells construction products online through a platform hosted on DigitalOcean with a monolithic, single-tier architecture. To address challenges in scalability, stability, and high availability, we plan to modernize the platform with a microservices-based architecture, containerization, and automated autoscaling for improved performance and future readiness.



Challenges

- Scalability
- High Availability
- Stability
- Security
- Modernization Gaps
- Deployment Inefficiencies
- Cost Management



Our Solutions

- **User Access via CloudFront and Route53:**

- Users access the application through CloudFront distributions with DNS management by Route53, ensuring low-latency and globally distributed traffic handling.

- **EKS Cluster with Modular Pods:**

- The application is containerized into distinct modules (API, Main, and Logistic) running in isolated pods within the EKS cluster, enabling modular scaling and deployment.

- **Load Balancers:**

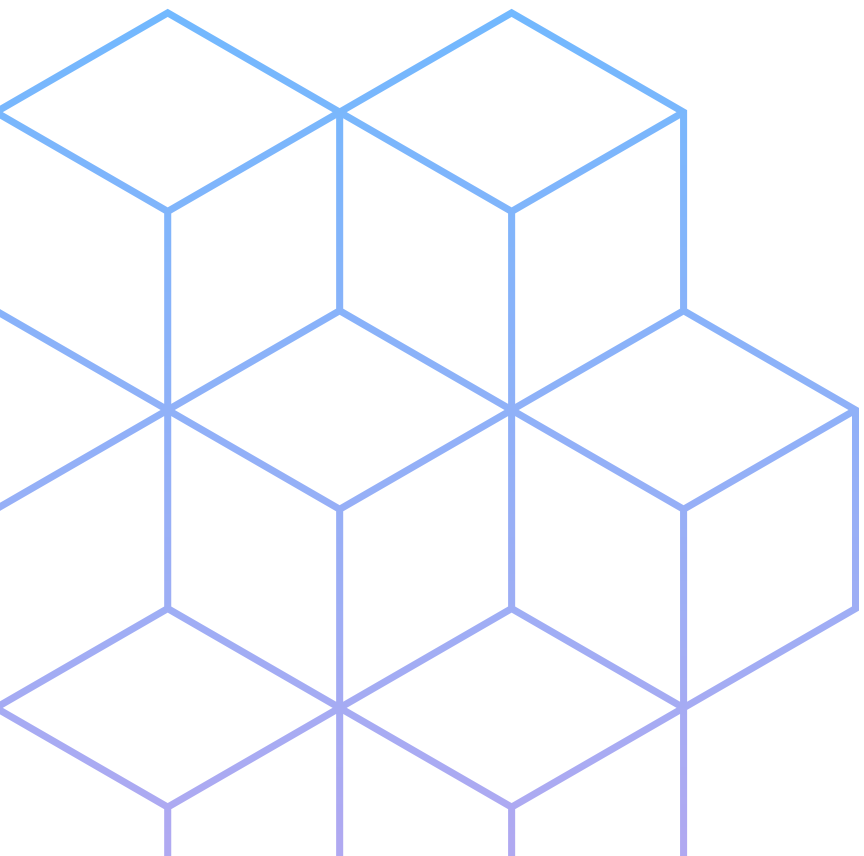
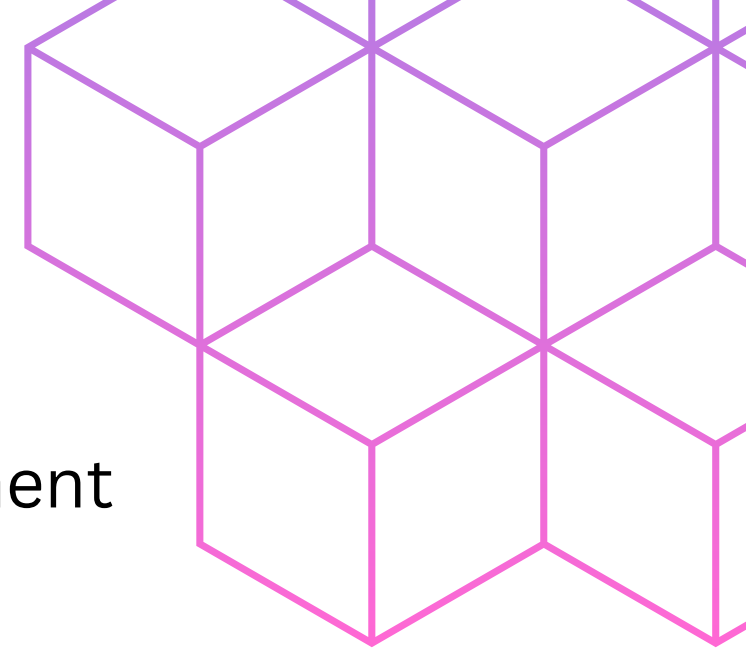
- Application Load Balancers (ALBs) distribute traffic across pods, ensuring even workload distribution and failover support.

- **Amazon RDS for Data Storage:**

- A robust database solution using Amazon RDS ensures high availability, automated backups, and scalability for persistent storage needs.

- **Horizontal Pod Autoscaler (HPA):**

- Automatically scales the number of pods for each microservice based on real-time metrics such as CPU and memory utilization, ensuring consistent performance during traffic surges.



Our Solutions

- **Vertical Pod Autoscaler (VPA):**

- Dynamically optimizes resource requests and limits for each microservice, improving cost efficiency while maintaining performance.

- **Infrastructure Monitoring:**

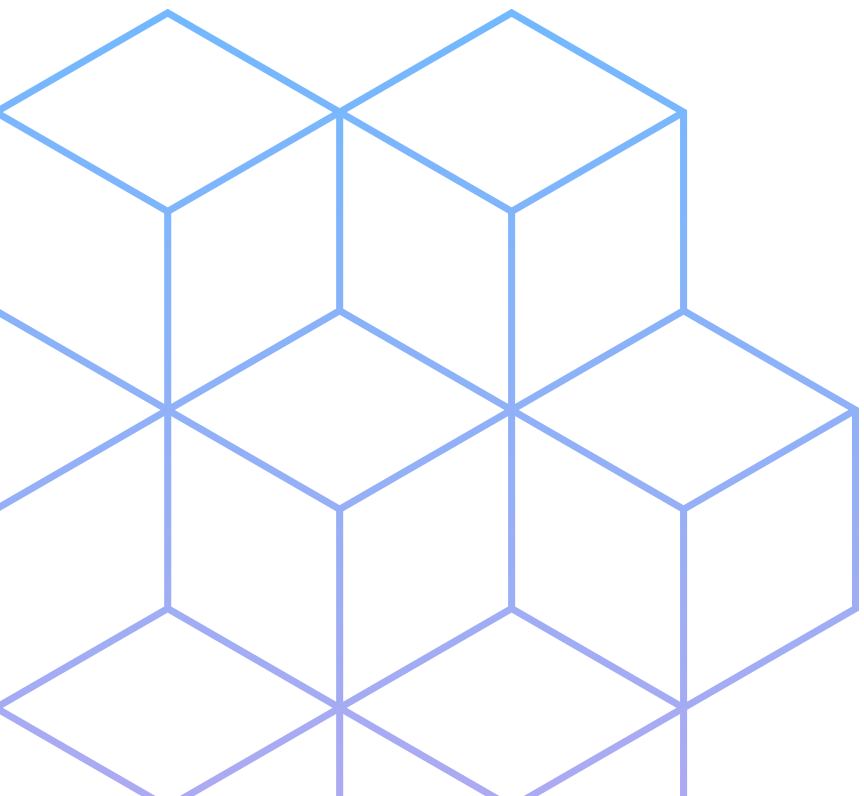
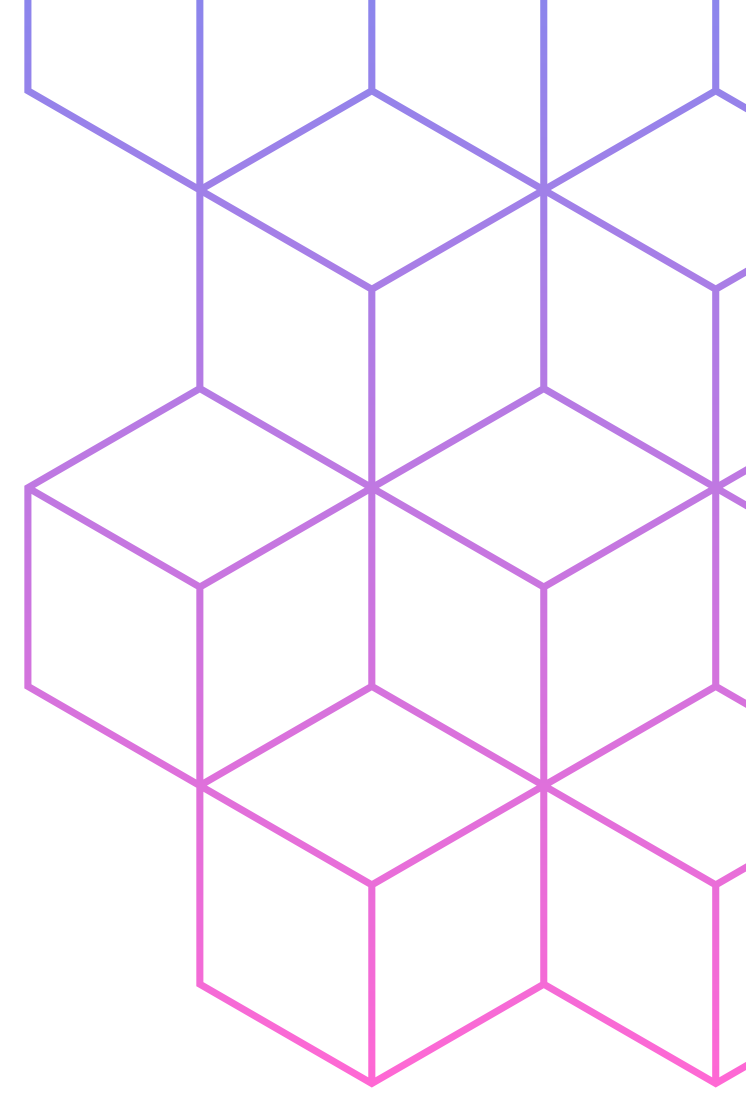
- CloudWatch and CloudTrail provide real-time monitoring, logging, and security event tracking for proactive management of the infrastructure.

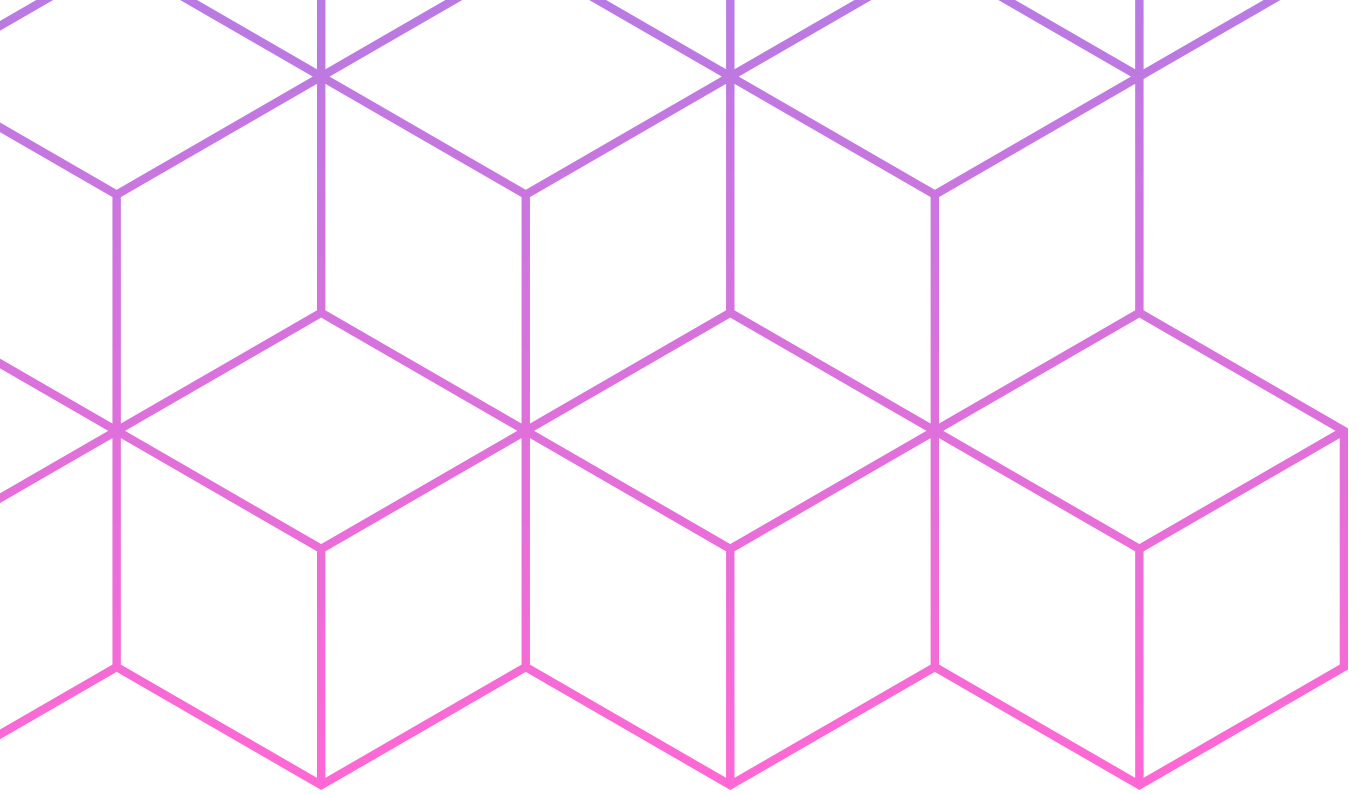
- **Jenkins CI/CD Pipeline:**

- Continuous Integration and Continuous Deployment (CI/CD) pipelines managed by Jenkins streamline code delivery and deployments for individual microservices, leveraging BitBucket as the source code repository.

- **Scalable and Resilient Infrastructure:**

- Kubernetes auto-scaling ensures the infrastructure scales up or down based on demand, while Kubernetes namespaces and RBAC enhance security and service isolation.
- Auto-scaling policies extend to the underlying nodes, ensuring cost-efficient operation.





Benefits of the solutions

- **Scalability:**
 - The integration of Horizontal Pod Autoscaler (HPA) ensures that application pods scale dynamically based on traffic and resource demand.
 - Vertical Pod Autoscaler (VPA) optimizes resource allocation, preventing over-provisioning or underutilization.
 - The architecture is capable of handling sudden traffic spikes and long-term growth effortlessly.
- **High Availability:**
 - Load balancers (ALBs) ensure even traffic distribution across services, reducing downtime and improving user experience.
 - Redundant systems within the EKS cluster and Amazon RDS provide fault tolerance and quick recovery.
- **Improved Performance:**
 - Modular microservices ensure that each service runs independently, reducing bottlenecks caused by monolithic structures.
 - Optimized resource usage via HPA and VPA ensures consistent performance under varying workloads.
- **Improved Monitoring and Visibility:**
 - Comprehensive monitoring using CloudWatch and CloudTrail ensures proactive issue detection and resolution.
 - Metrics and logs provide valuable insights into application performance and user behavior.



Benefits of the solutions

- **Faster Development and Deployment:**
 - Microservices architecture allows independent development, testing, and deployment of each module, accelerating time-to-market for new features.
 - Jenkins CI/CD pipelines automate the build and deployment process, minimizing human error and enabling faster rollouts.
- **Enhanced Security:**
 - Kubernetes namespaces and role-based access control (RBAC) ensure isolated and secure environments for different microservices.
 - CloudTrail and CloudWatch provide real-time logging and monitoring to detect security threats and anomalies.
- **Flexibility and Agility:**
 - The decoupled microservices architecture allows easy updates or replacement of individual services without impacting others.
 - Modular design enables seamless adoption of new technologies and features.
- **Future-Ready Architecture:**
 - The solution is built on modern, cloud-native technologies like Kubernetes and microservices, making it easier to adopt emerging tools and practices.
 - It provides a solid foundation for implementing advanced features like service mesh, observability, and multi-cloud strategies.

Resource Used

- EKS
- EC2
- VPC
- ALB
- ECR
- Amazon CloudWatch
- Amazon CloudTrail
- Route53
- Amazon CloudFront
- NAT Gateway
- Amazon AutoScaling
- IAM
- RDS
- Secret Manager
- EFS
- S3

