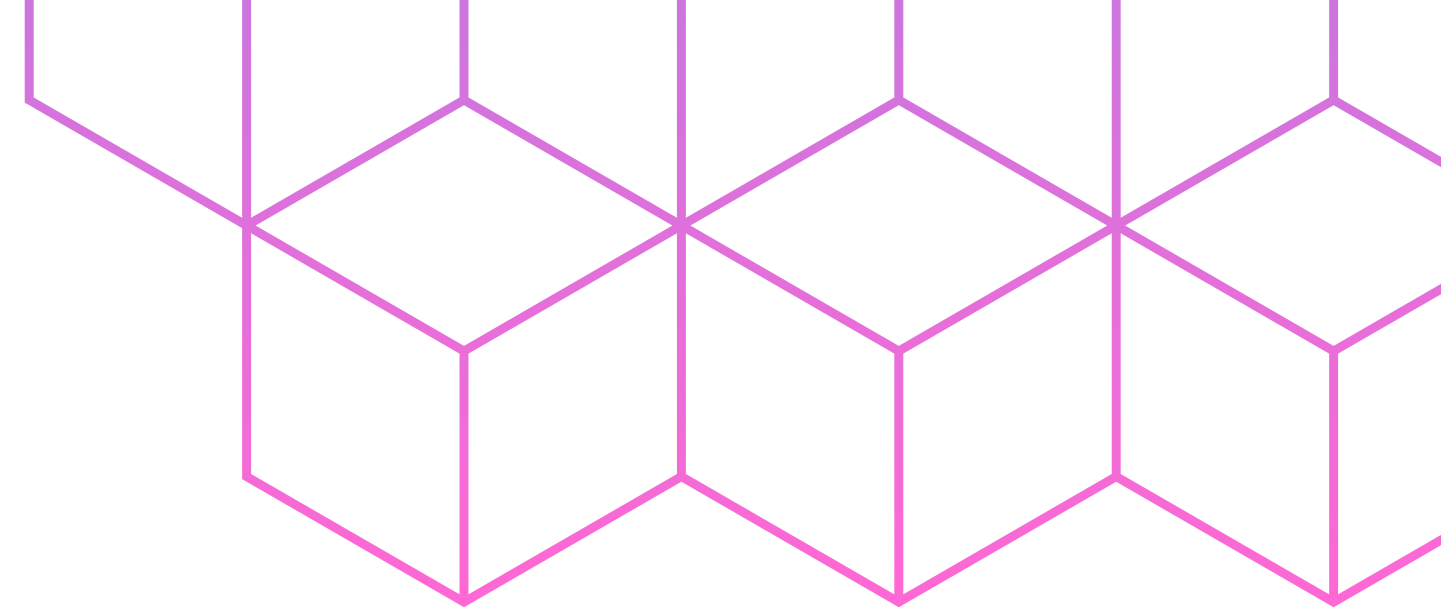




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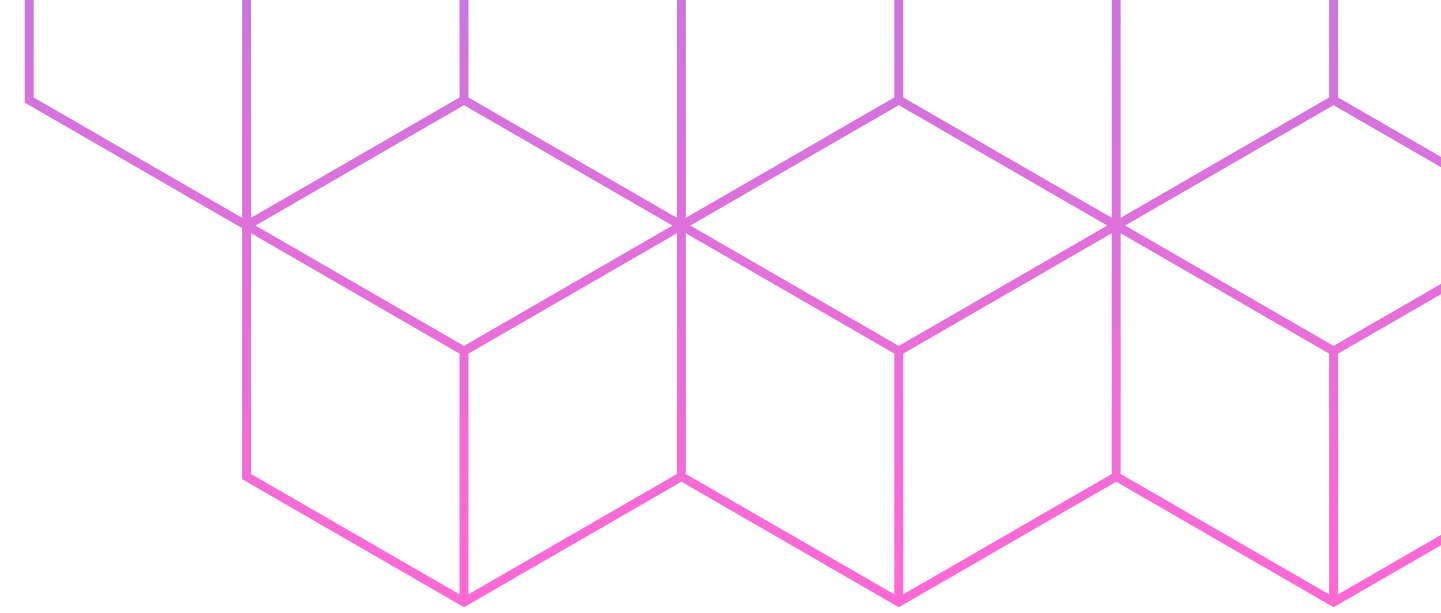


AWS EKS with CICD

Case Studies - 1

Introduction

End Client is the technology partner who serves their SAAS services to the leading workforce development company and a nonprofit focused on skilling and financial inclusion aim to impact 100 million lives using a flagship AWS-based platform. They face challenges in scaling infrastructure, enhance security features and optimizing AWS costs, requiring innovative solutions for growth and efficiency.

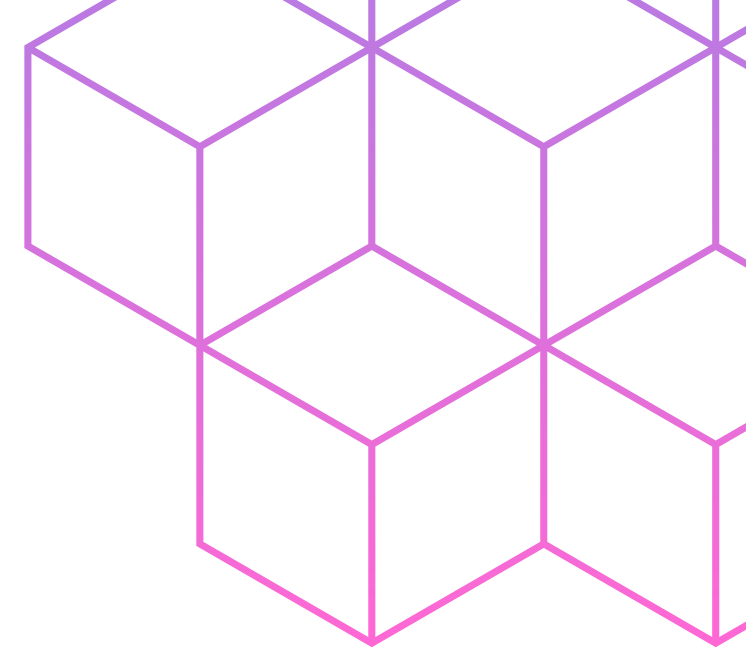


Challenges

- Insecure Network Design
- Lack of Automatic Scaling
- Expensive Infrastructure
- Suboptimal CI/CD Pipeline
- Migration Complexity
- Security Compliance
- Limited Internal Expertise



Our Solutions



- **VPC Design:**

- Private subnets for Kubernetes workloads, ensuring enhanced security.
- Public subnets used only for necessary resources such as NAT Gateways and ALB

- **EKS Cluster:**

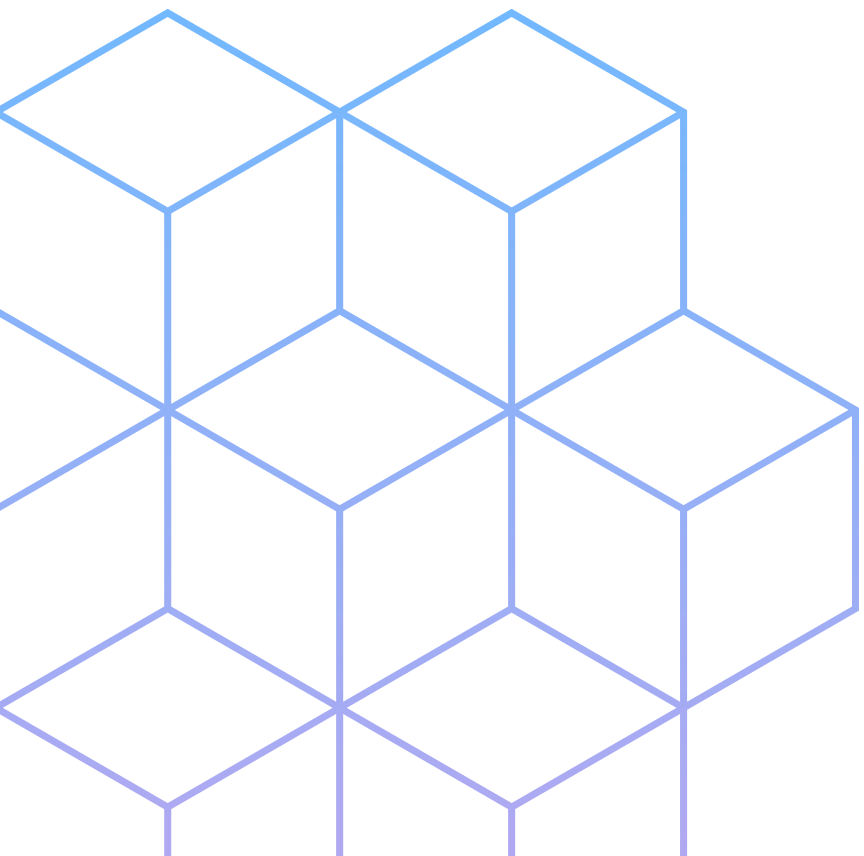
- Kubernetes workloads are hosted in the EKS Cluster distributed across multiple availability zones for high availability.
- Modules within the cluster are configured with Horizontal Pod Autoscaling (HPA) and Vertical Pod Autoscaling (VPA) for optimal resource utilization.
- Auto-scaling of EC2 nodes in the cluster is enabled to handle variable workloads efficiently.

- **CI/CD Integration:**

- Jenkins are used for managing CI/CD workflows.
- Container images are stored securely in Elastic Container Registry (ECR).

- **Security:**

- Private endpoints are used for accessing services like MongoDB, ensuring secure communication.
- Secrets Manager manages sensitive data like API keys and credentials securely.
- Private endpoints are used for accessing services like MongoDB, ensuring secure communication.



Our Solutions

- **Monitoring and Logging:**

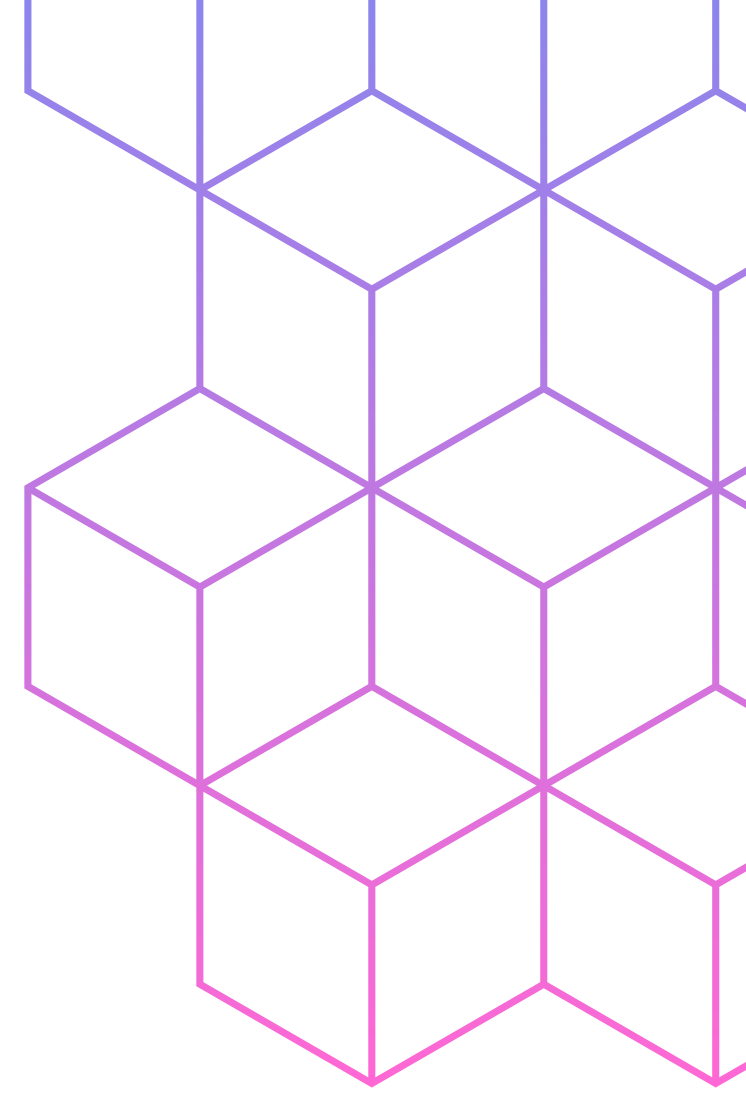
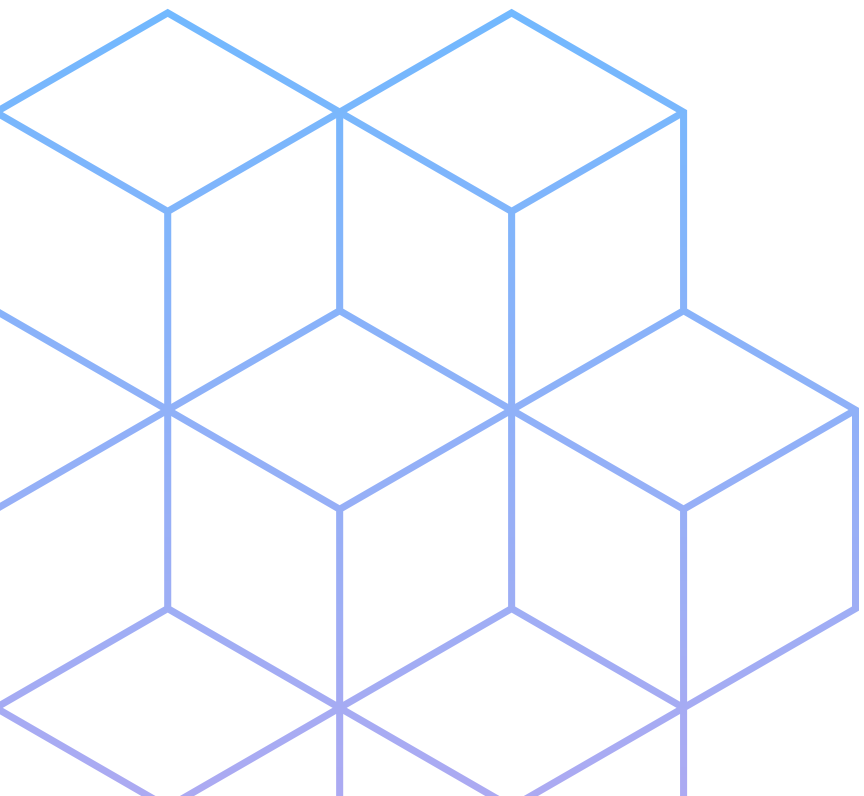
- CloudWatch and CloudTrail are integrated for performance monitoring and auditing activities.
- Alerts are configured for resource usage and anomalies.

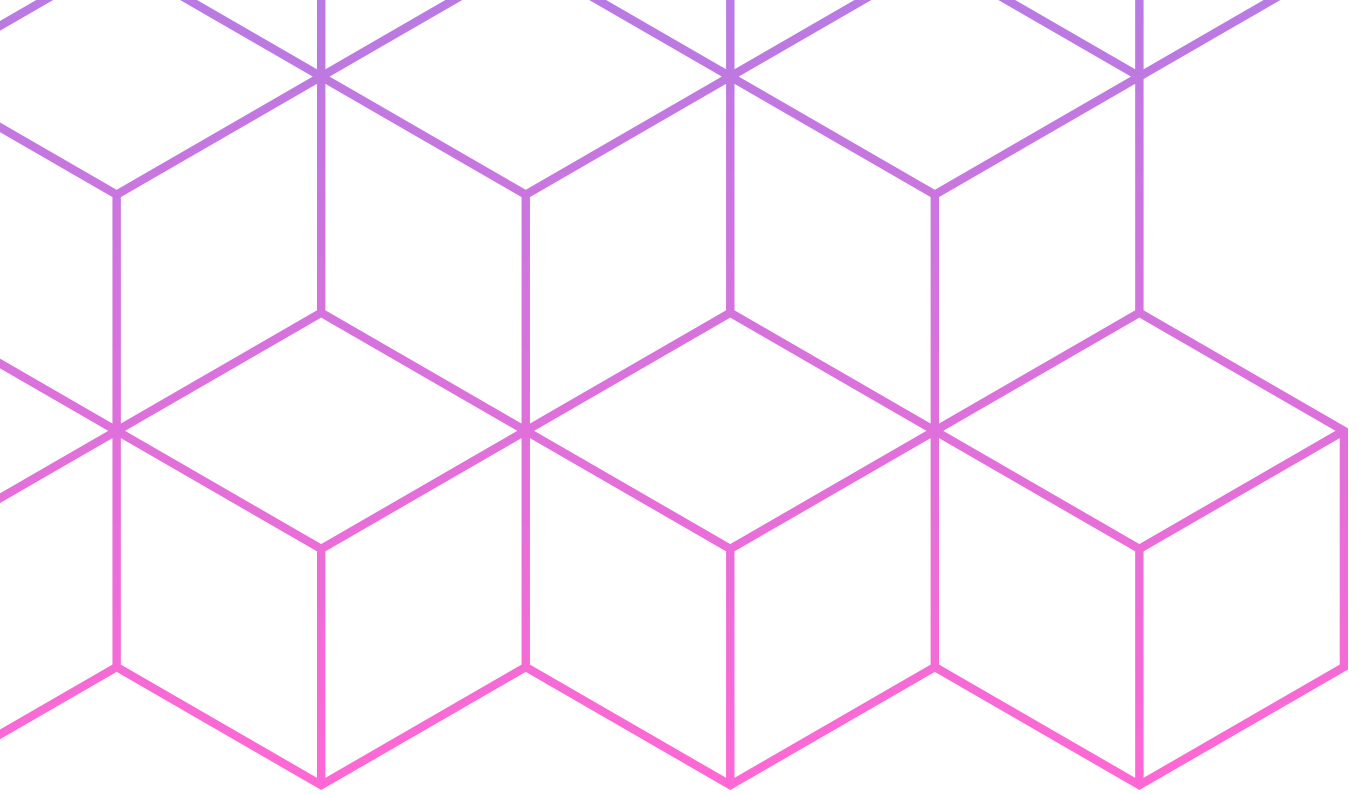
- **Networking:**

- An Application Load Balancer (ALB) is used for routing external traffic securely to the private subnets.
- CloudFront and S3 provide CDN and object storage, improving content delivery and scalability.
- VPC Endpoints ensure secure and cost-effective communication between AWS services.

- **Scalability and Future Readiness:**

- The architecture supports dynamic scaling of resources, ensuring it can handle increased workloads.
- Cost optimization measures like minimizing public subnets, using private VPC endpoints, and leveraging AWS auto-scaling mechanisms reduce operational expenses.





Benefits of the solutions

- **Enhanced Security:**
 - Workloads are hosted in private subnets, minimizing exposure to public access and reducing the attack surface.
 - secure VPC endpoints ensures data security and compliance with industry standards.
- **Scalability and High Availability:**
 - Horizontal Pod Autoscaling (HPA) and Node Auto Scaling dynamically scale resources to handle varying workloads, ensuring seamless performance during traffic spikes.
 - Multi-AZ deployment of the EKS cluster enhances fault tolerance and high availability.
- **Cost Optimization:**
 - Use of private VPC endpoints reduces data transfer costs.
 - Dynamic scaling and optimized resource provisioning minimize underutilization and over-provisioning, significantly lowering operational expenses.
- **Streamlined CI/CD Processes:**
 - Jenkins automates build, test, and deployment workflows, reducing time-to-market and increasing developer productivity.
 - Use of ECR for secure container image storage ensures efficient pipeline operations.



Benefits of the solutions

- **Centralized Monitoring and Logging:**
 - CloudWatch and CloudTrail provide real-time performance insights, anomaly detection, and comprehensive auditing for improved operational visibility and reliability.
- **Future-Ready Infrastructure:**
 - The architecture is designed to handle 10x workload growth, with a flexible and scalable setup that supports increasing demand.
 - Optimized networking, Kubernetes integration, and robust automation ensure readiness for future business requirements.
- **Improved Performance and User Experience:**
 - Leveraging Application Load Balancer (ALB) ensures efficient traffic routing and better handling of user requests, improving application response times and user satisfaction.
 - Integration with CloudFront and S3 enhances content delivery speed, providing a seamless experience for end-users, even under heavy loads.
- **Simplified Maintenance and Operations:**
 - Automation of scaling, deployments, and monitoring reduces manual intervention, lowering operational overhead.
 - The use of centralized tools like Jenkins, CloudWatch, and Secrets Manager simplifies management and ensures smooth operations for the development and infrastructure teams.

Resource Used

- EKS
- EC2
- VPC
- GuardDuty
- ALB
- ECR
- Amazon CloudWatch
- Amazon CloudTrail
- Amazon CloudFront
- NAT Gateway
- VPC Endpoint
- Amazon AutoScaling
- IAM
- MongoDB
- Secret Manager
- S3

