HIPAA-Compliant Agentic AI Platform for Automated Claims Intelligence Using AWS Bedrock

Mactores built a secure, HIPAA-compliant Agentic AI platform for KlearTrust using AWS Bedrock to automate medical document processing, accelerate claim intelligence, and improve audit readiness.

Case Study
Summary

- Designed a secure, HIPAA-compliant Agentic AI architecture using AWS Bedrock, Lambda, ECS Fargate, and Step Functions.

- Automated medical document extraction, entity recognition, and claim review with high accuracy and sub-2s inference latency.

- Implemented a multi-tier security model with mTLS, fine-grained IAM, KMS encryption, and SSO integration with Okta for zero-trust operation.

- Deployed retrieval-augmented reasoning using OpenSearch, Comprehend Medical, and structured JSON-mode outputs for audit-ready claim adjudication.

- Embedded Responsible AI guardrails, validation layers, PHI de-identification, and explainability controls to ensure safe, compliant, and traceable AI behavior.

- Delivered full observability with CloudWatch, X-Ray, and OpenSearch, enabling drift detection, safety monitoring, and continuous improvement cycles.

About
The Customer

KlearTrust

KlearTrust is a healthcare analytics company that provides advanced insights for payers, providers, and employers. Their platform helps organizations reduce costs, improve care quality, and streamline claims analysis with data-driven intelligence while maintaining strict privacy and regulatory compliance.
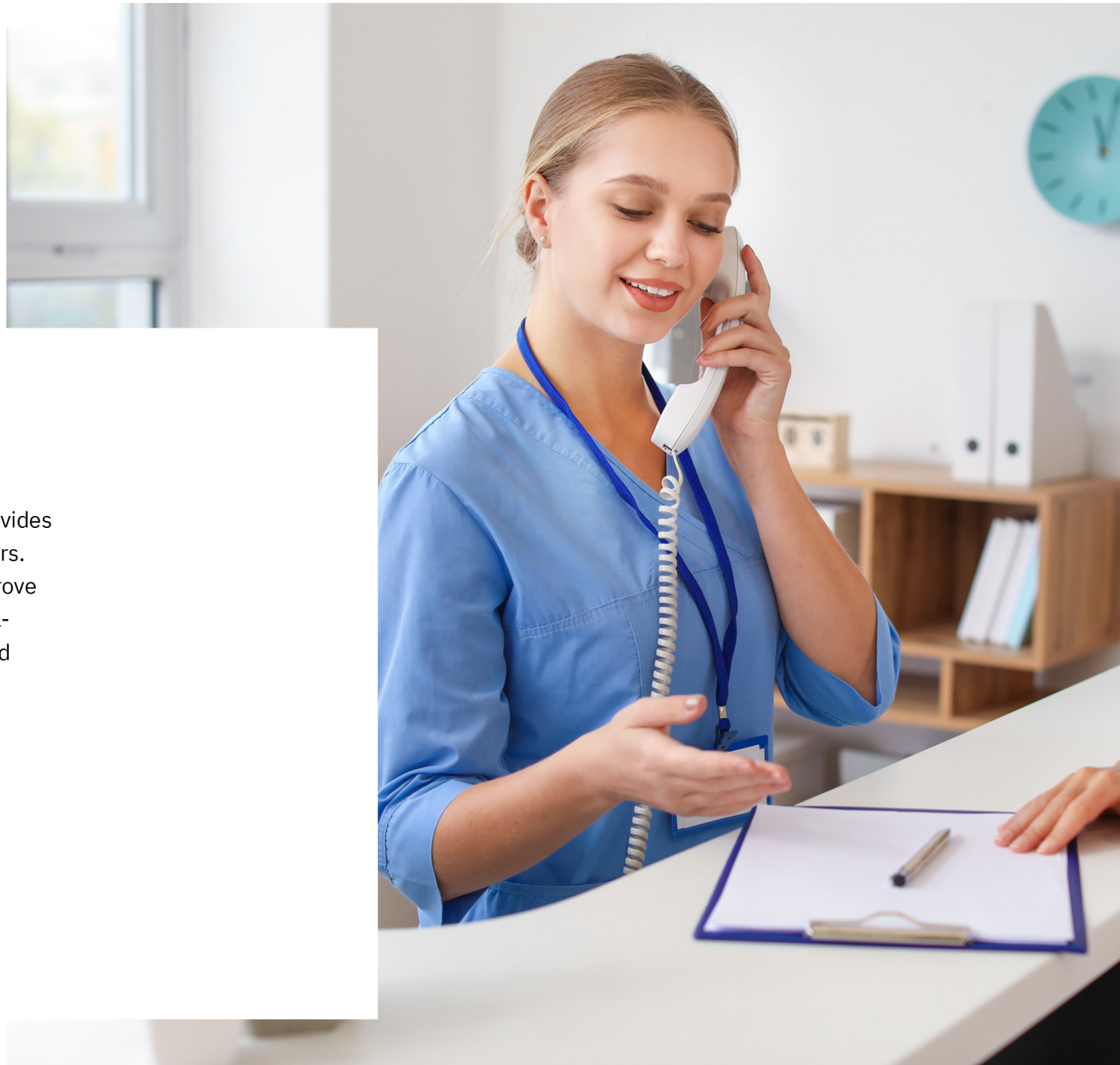
Customer
Situation

KlearTrust needed to accelerate how clinical documents, claims, and supporting evidence were analyzed across complex healthcare workflows. Manual review was slow, error-prone, and difficult to scale for high-volume customers. They required automated extraction of medical entities, summarization, and structured claim insights while ensuring complete HIPAA compliance. The environment included PHI-sensitive workloads requiring strict encryption, strong access controls, and detailed audit trails.

KlearTrust also needed seamless integration with existing APIs, analytics pipelines, and identity providers. Any Agentic AI approach requires accuracy, safety, explainability, and predictable performance. Their challenge was to build an autonomous, highly governed AI framework capable of handling medical documents while maintaining trust, transparency, and operational assurance.

Our
Approach

Business
Outcomes

Technical
Outcomes

Mactores designed a modular Agentic AI architecture using AWS Bedrock for reasoning, extraction, and summarization. Lambda, Fargate, and Step Functions powered agents for retrieval, validation, and structured output generation. Comprehend Medical and OpenSearch enhanced entity detection and contextual retrieval. A HIPAA-aligned security model enforced private VPC endpoints, mTLS, granular IAM, short-lived credentials, and KMS encryption. Responsible AI layers added guardrails, PHI protections, output validation, and full explainability. CloudWatch, X-Ray, and OpenSearch delivered actionable observability.

KlearTrust reduced manual claim review time by over **60%** while improving accuracy and operational consistency. Automated extraction and reasoning accelerated the delivery of high-quality insights for payers and employers. Claims teams gained reliable, explainable outputs with an audit-ready structure and documentation. The platform improved scalability, reduced operational effort, and enhanced customer trust through compliant and transparent AI.

The system achieved low-latency inference using Bedrock models through secure VPC endpoints. Lambda, Fargate, and Step Functions provided scalable, fault-tolerant orchestration. IAM boundaries enforced zero-trust access, while KMS, mTLS, and encrypted storage protected PHI. Validation layers ensured accuracy, and OpenSearch-driven retrieval improved contextual reasoning. Unified observability enabled rapid debugging, drift monitoring, and ongoing optimization.

Getting
Started

Mactores initiated discovery workshops to understand KlearTrust's workflows, compliance needs, and integration points. Model benchmarking determined accuracy, cost, and latency across Bedrock options. Architectural design established secure connectivity, IAM controls, retrieval patterns, and validation logic. A pilot using synthetic PHI validated safety and performance. Mactores delivered production-ready IaC, documentation, governance controls, and training to support long-term adoption and continuous improvement.

Our
Solutions
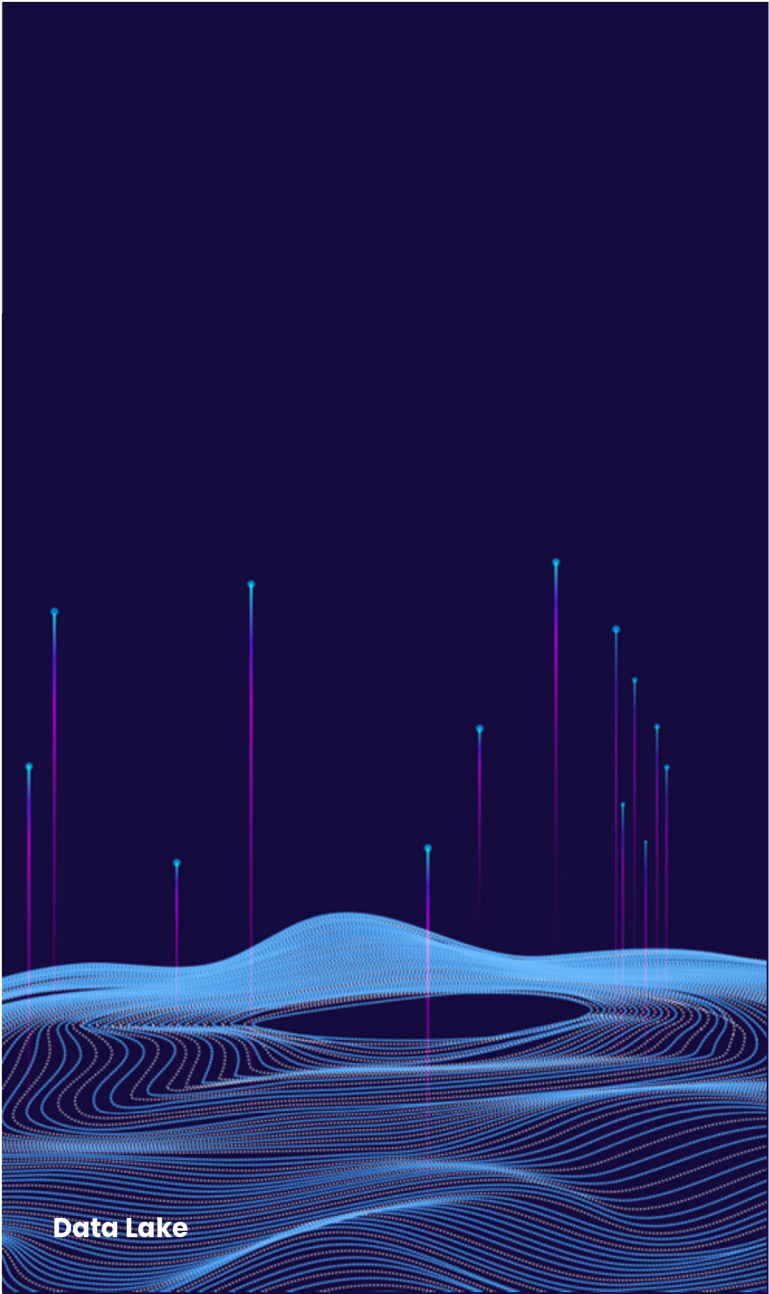
Data Lake

Data Lake

Databases

Data Ops

Generative AI

Our **Process**

Digital transformation via assessments, migration or modernization

We work alongside your tech team to assess and strategize what you need and how to implement the right data solutions on time, on budget and with c-suite buy in.

Assess

- Discovery Automation
- Future State Assessment
- GAP Analysis
- End State
- Road Map
- TCO

Migrate

- Strategy
- Execution
- Migrate
- Migration Acceleration

Modernize

- StrategyFuture State
- Design
- Build
- Automate

AWS Validated
Competencies

aws PARTNER Advanced Tier Services

aws PARTNER ML Services Competency

aws PARTNER Data & Analytics Services Competency

aws PARTNER DevOps Services Competency

aws PARTNER Migration Services Competency

aws PARTNER Healthcare Services Competency

aws PARTNER AI Services Competency

aws PARTNER Generative AI Services Competency

aws 200 CERTIFIED

aws PARTNER Immersion Day

AWS Validated
Service Deliveries

aws PARTNER Amazon Redshift Delivery

aws PARTNER Amazon RDS Delivery

aws PARTNER AWS Database Migration Service Delivery

aws PARTNER Amazon EMR Delivery

aws PARTNER AWS CloudFormation Delivery

aws PARTNER AWS Glue Delivery

aws PARTNER Amazon QuickSight Delivery

aws PARTNER Amazon Kinesis Delivery

aws PARTNER AWS Config Delivery

aws PARTNER Amazon MSK Delivery

aws PARTNER Amazon DynamoDB Delivery

aws PARTNER AWS Service Catalog Delivery

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