



# Getting Started with

## Case Studies



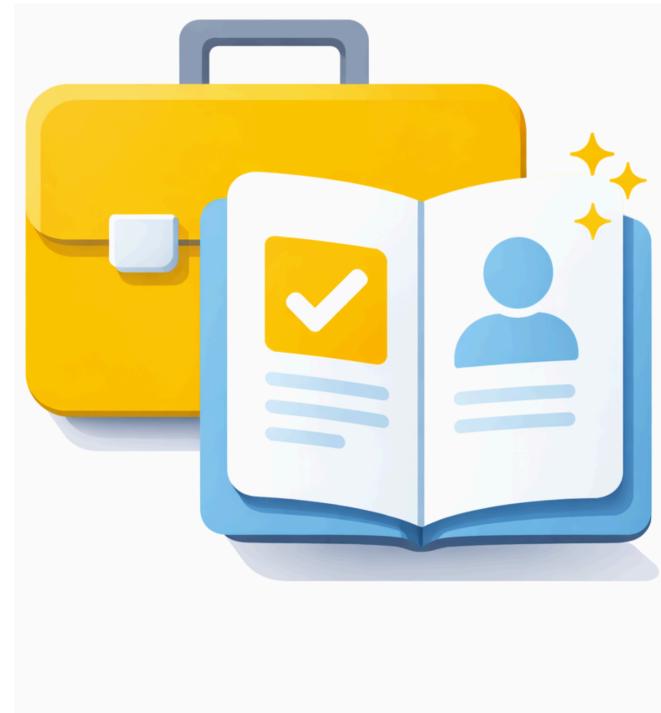
# Case Studies - Importance

**Key Part** - Of certification exam

**Download** - From *Official Guide*

## Key Resources

- **Google Cloud Well-Architected Framework** - Best practices for designing, building, and operating secure, efficient, and reliable cloud solutions on Google Cloud
- **Cloud Architecture Center** - Discover reference architectures, design guidance, and best practices





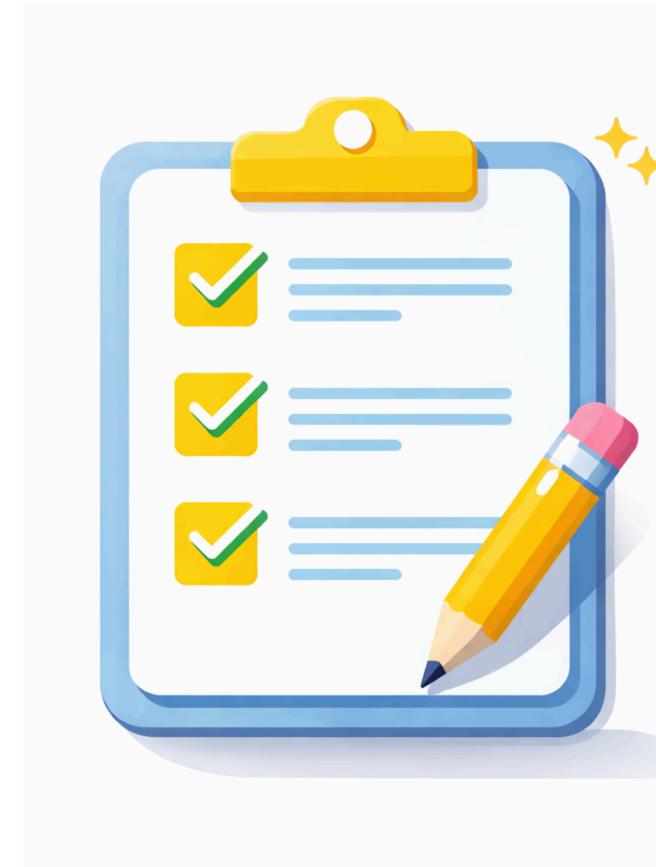
# Case Studies - Mindset & Exam Best Practices

## Best Attitude - Test yourself as architect

- **Understand Domains** - ML, Gen AI, Healthcare, Retail, Media & Streaming
- **Analyze & Reflect** - Form your own opinions
- **Challenge Solutions** - Do not accept recommendations blindly

## During Exam - You can read case study but do NOT depend on it

- **Before Exam** - Get clear overview of each case
- **Exam Tip** - Group questions per case study and answer together



# Altostrat Media Case Study - Overview

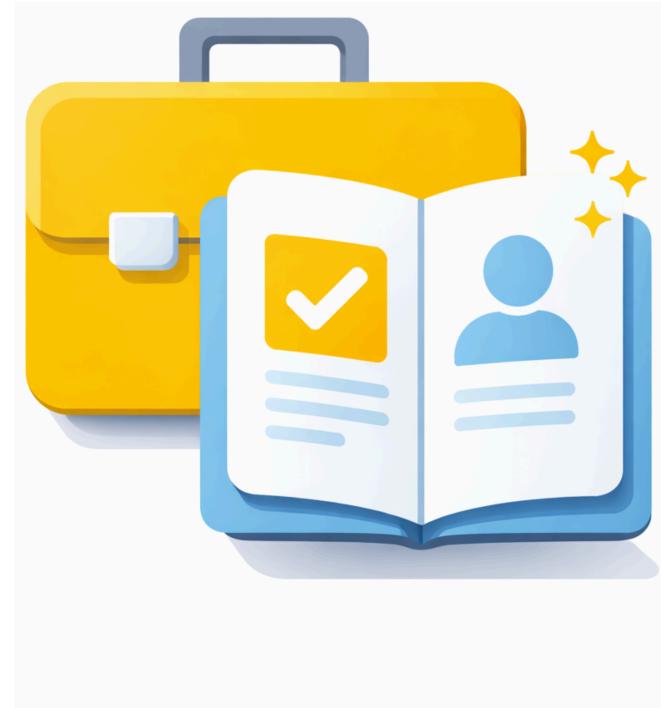


**Company** - Leading media provider with vast audio and video library

- Podcasts, interviews, news broadcasts, and documentaries
- **Priorities:** Reliability and cost management

**Goal** - Modernize content management and user engagement strategies using AI

- Drive revenue growth through dynamic pricing, targeted marketing, and personalized product recommendations
- Seamless self-service support

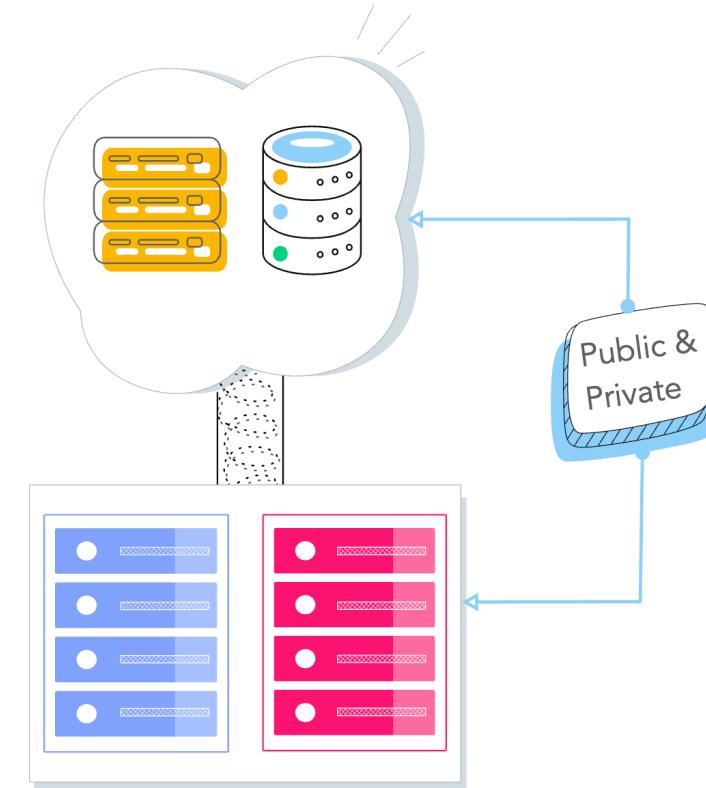


# Altostrat Media - Existing Technical Environment



**Hybrid Setup** - Some on-prem legacy systems for content ingestion and archival

- Slated for modernization & migration to Google Cloud
- **GKE** - Content management and delivery platform
- **Cloud Storage** - Hosts their vast media library
- **BigQuery** - Data Warehouse (Analyze user behavior, content consumption, and audience demographics)
- **Cloud Run Functions** - Event driven tasks (video transcoding, metadata extraction, and personalized content recommendations)
- **Identity** - Google Identity + third-party providers
- **Observability** - Cloud Monitoring + Prometheus (email alerts)



# Altostrat Media - Business Requirements



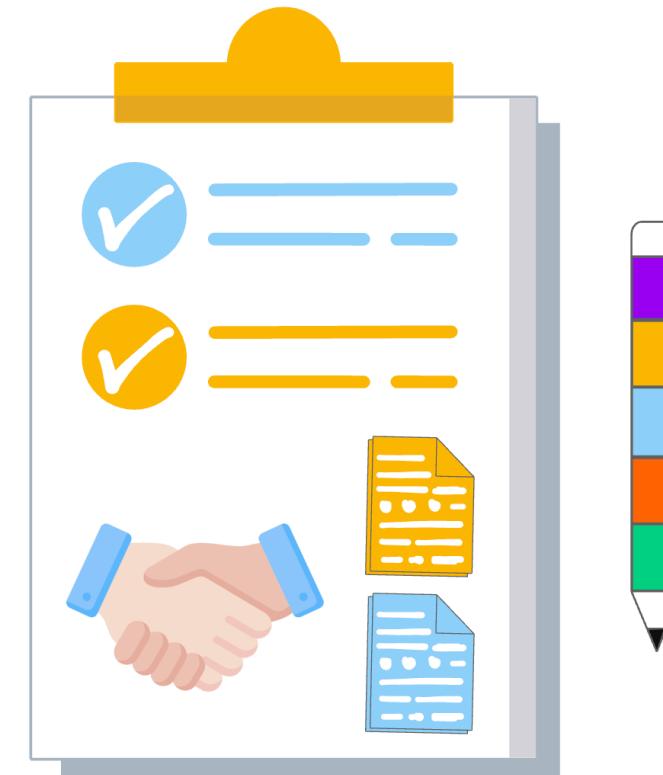
**Improve Reliability** - For Operational Workflows across hybrid environments

- **Simplify Infra Management** - Faster CI/CD

**Cost Optimization** - For cloud storage

**AI:** Better Content Mgmt, User Engagement

- **Data Driven Decisions** - Content strategy
  - Identify trends and extract insights
- **Summarization** - Auto-summarize media content
- **Metadata Extraction** - Directly from content
- **Content Filtering** - Detect inappropriate content
- **Customer Support** - Enable chat and support (24 X 7)





# Altostrat Media - Technical Requirements

**Secure performant hybrid cloud connectivity** - For data ingestion

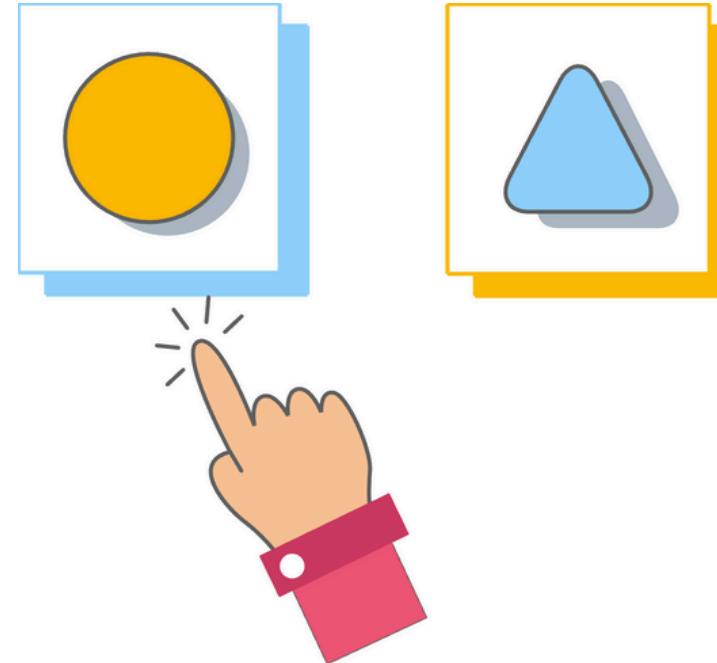
**Scalable GKE Clusters** - Across Hybrid Cloud

- Modernize CI/CD - Centralized deployment

**Optimize Costs** - For Cloud Storage

**Make Best Use of AI** - Detect harmful content, ensure auditability and explainability

- Personalize Experiences - AI recommendations
- Advanced Chatbots - Customer Assistance
- Automated Summarization - Of media content



# Altostrat Media - Discussion [1/2]



Service	Discussion
GKE Enterprise	Scalable container platform for hybrid workloads
BigQuery	Data Driven Decisions - Analyze user behavior, content trends
Pub/Sub & Dataflow	Real-time ingestion and transformation pipelines
Cloud Storage	Tiered storage for cost optimization (Classes - Standard, Nearline etc)
Cloud Build + Cloud Deploy + Artifact Registry	Modernize CI/CD
Cloud Observability	Unified observability and alerting
Cloud Interconnect	Secure, high-performance hybrid connectivity
Cloud Run Jobs	Functions have execution time limits - Cloud Run Jobs can be used for heavy, long-running jobs (video transcoding etc)

# Altostrat Media - Discussion [2/2]



Service	Discussion
Vertex AI Platform	Train, tune, and deploy ML models (Cloud Audit Logs Integration for Auditability, Explainable AI for Explainability)
BigQuery ML	Create ML models using familiar SQL
Vision AI, Video AI	Video and Image content filtering
Cloud Speech-to-Text API + Generative AI models on Vertex AI	Auto-summarize media content and metadata extraction
Conversational AI Platforms (CAIP) with Dialogflow	Build virtual agents (chatbots)
Customer Engagement Suite with Google AI (Conversational Agents + Agent Assist + Conversational Insights + Contact Center as a Service)	Enable chat and support (24 X 7)



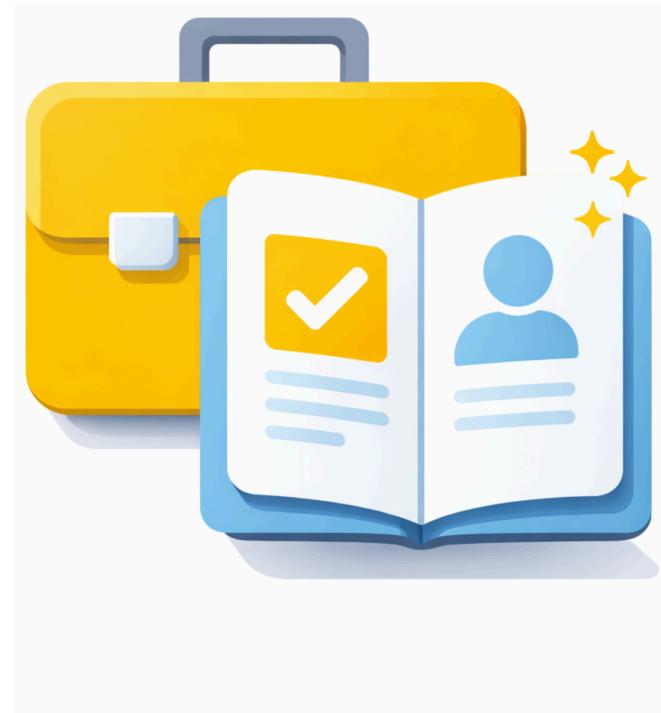
# Cymbal Retail Case Study - Overview

**Cymbal** - Online retailer experiencing significant growth with diverse product portfolio

**Challenge** - Complex catalog management and manual workflows

## Solution Concept: 3 Focus Areas

- 1: Catalog and Content Enrichment
- 2: Conversational Commerce with Product Discovery
- 3: Technical Stack Modernization





# Cymbal Retail Case Study - 3 Focus Areas

## Solution Concept: 3 Focus Areas

- **Catalog and Content Enrichment** - Use Gen AI to improve accuracy of product catalog
  - Generate product attributes, descriptions, and images from supplier-provided information
  - **Goal:** Streamline catalog mgmt, reduce manual effort and errors, and ensure consistent info across sales channels
- **Conversational Commerce with Product Discovery** - Integrate AI-powered agents to provide personalized experience (using Google Cloud's Discovery AI)
- **Technical Stack Modernization:** Streamline operations and reduce manual costs (Cloud-based infrastructure, Secure and efficient data handling, Proactive monitoring and security)





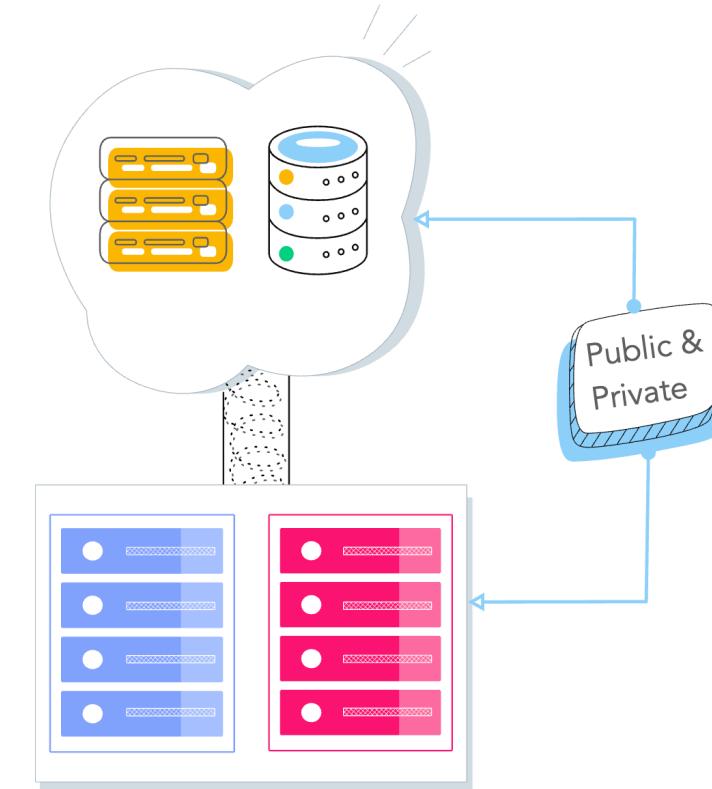
# Cymbal Retail - Existing Technical Environment

## Infrastructure - Mix of on-prem and cloud

- **Databases** - MySQL, SQL Server, Redis, MongoDB
- **Apps** - Kubernetes clusters running workloads
- **Hybrid Cloud** - Legacy file transfers + batch ETL jobs

## Applications: Web App + IVR

- **Web App** - Browse product catalog (integrated with relational databases)
- **IVR (Interactive Voice Response)** - Handle customer calls and route to appropriate agents
- **Call center agents** - Handle transfers from IVR and manually enter orders when customers face issues
- **Monitoring** - Various tools - Grafana, Nagios, Elastic



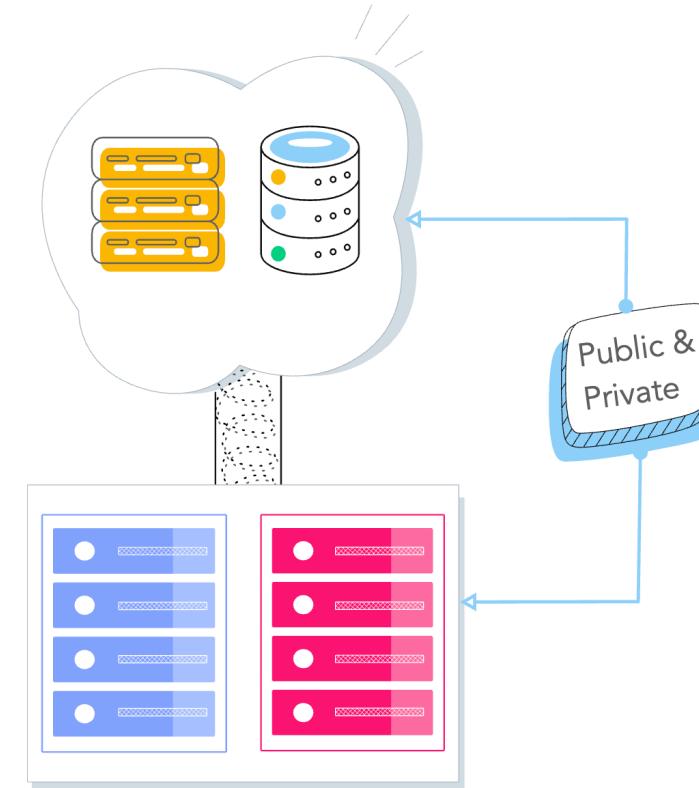


# Cymbal Retail - Existing Technical Environment - Challenges

**Manual Processes:** Make things time-consuming and error-prone

**Data Silos:** Provides limits unified view of the customer journey

**Integrating New Technologies:** Is difficult





# Cymbal Retail - Business Requirements

## Automate Product Catalog Enrichment -

Reduce manual effort, minimize errors

## Improve Product Discoverability - Smarter

search and recommendations

## Increase Customer Engagement - Interactive

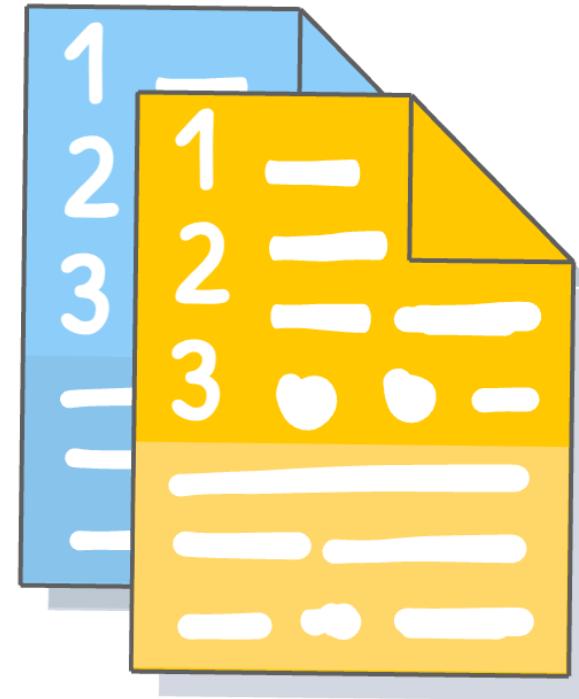
and personalized shopping experience

## Drive Sales Conversions - Intuitive and

helpful shopping experience

## Cut Costs - Reduce call center staffing costs

and data-center hosting costs





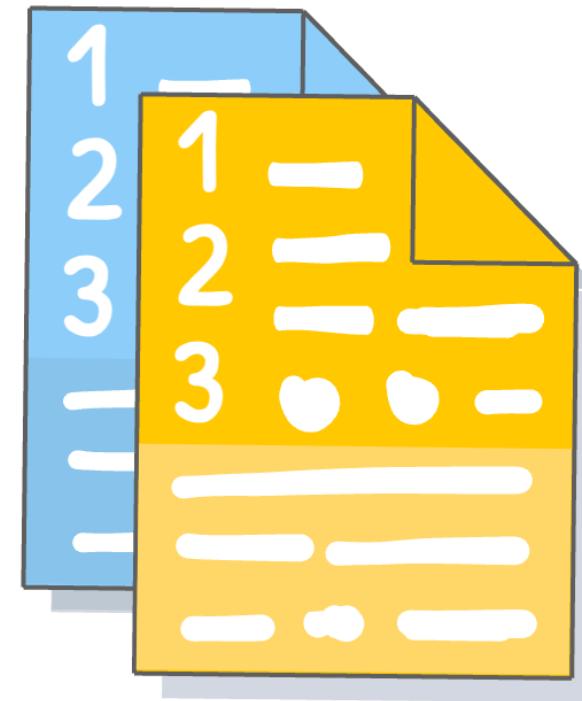
# Cymbal Retail - Technical Requirements

**Automate Product Discovery** - Natural language search for customers

**NFRs** - Securely handle growing catalog with good performance

**Human-in-the-Loop (HITL) Review** - UI for team to review/reject AI-generated content

- **Attribute Generation** - Derive product attributes from supplier data - titles, descriptions, and images
- **Image Generation** - Create variations from base image (support background changes, color adjustments, text overlays)





# Cymbal Retail - Discussion [1/2]

Service	Discussion
Google Cloud's Discovery AI	Retail Product Recommendations
Vertex AI Search	Enable natural language product search and discovery
Vertex AI Generative AI Studio, Generative AI Models, Vision AI, Natural Language AI	Derive product attributes from titles, descriptions and images
Vertex AI Generative AI Studio, Generative AI Image Models	Create and enhance product images (color, background, text overlays)
Conversational AI Platforms (CAIP) with Dialogflow	Build virtual agents (chatbots)
Customer Engagement Suite with Google AI (Conversational Agents + Agent Assist + Conversational Insights + Contact Center as a Service)	Enable chat and support (24 X 7)



# Cymbal Retail - Discussion [2/2]

Service	Discussion
Cloud Run (custom UI)	Enable Human-in-the-Loop content review
Google Kubernetes Engine (GKE), Cloud Run	Modernize application hosting for scalability and performance
Cloud Spanner, Cloud SQL, AlloyDB, Firestore, MemoryStore (Redis)	Support scalable, low-latency databases for catalog and transactions
Cloud Build/Deploy + Artifact Registry	Modernize CI/CD
Dataflow, Pub/Sub, BigQuery	Efficient data handling
Google Cloud Observability	Proactive monitoring
Security Command Center, VPC Service Controls, Cloud KMS, IAM, Cloud DLP	Ensure data security, privacy, and compliance

# EHR Healthcare Case Study - Overview



**Company** - Leading provider of electronic health record (EHR) software

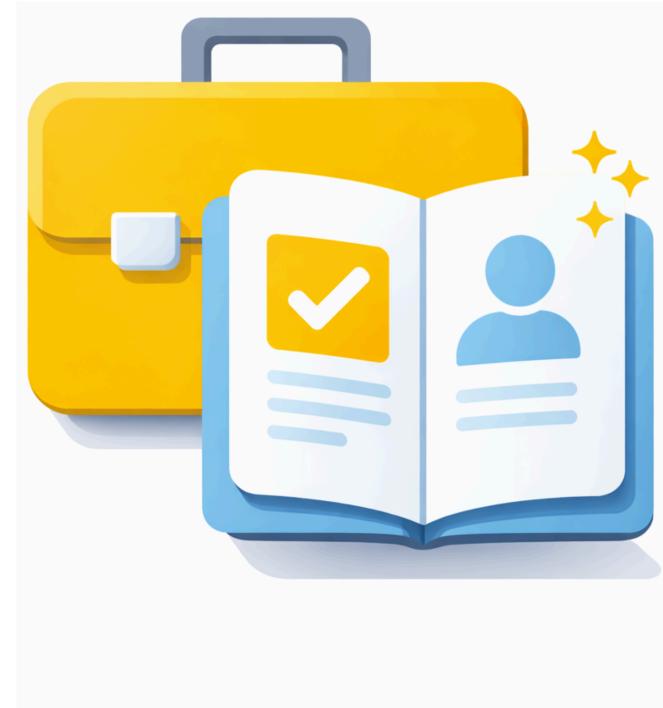
- **Model** - SaaS for hospitals, clinics, insurance providers

**Challenge** - Handling exponential growth

- **Solution** - Cloud migration for scalability, resilience, and agility

**Goal** - Modernize and scale - Google Cloud

- Adapt existing disaster recovery plan
- Update software at a fast pace (roll out new continuous deployment capabilities)



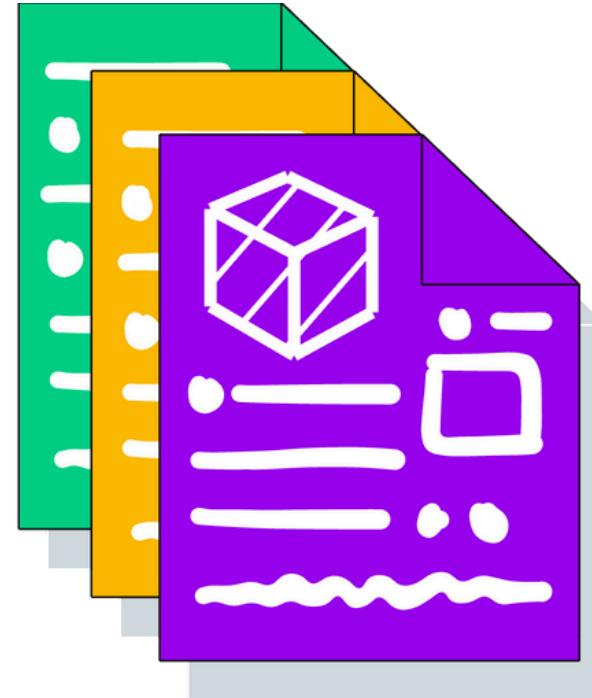


# EHR Healthcare - Executive Statement

**Current Approach:** On-premises strategy worked successfully for years

- **High Effort:** Major investment for team training
- **Complex Operations:** Teams managing similar but separate environments
- **Frequent Outages:** Caused by misconfigured systems and capacity limits
- **Monitoring Gaps:** Inconsistent practices led to delayed responses

**Future Direction:** Use Google Cloud to build scalable, resilient, multi-environment platform





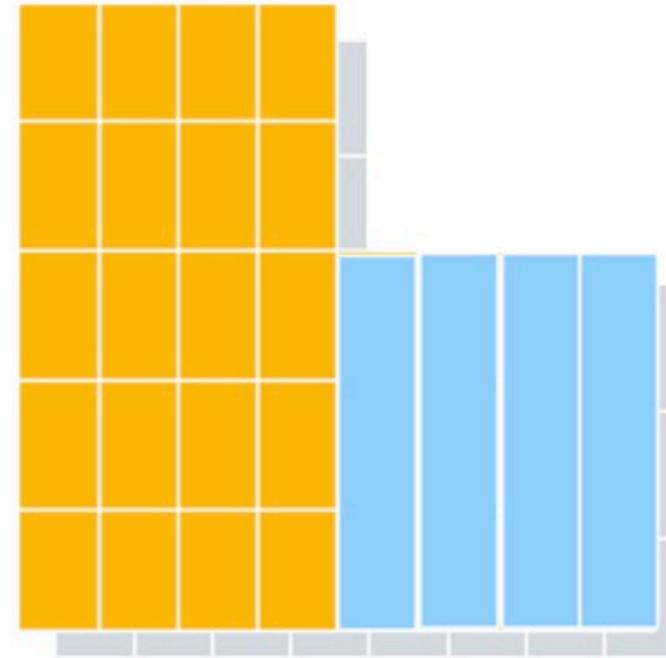
# EHR Healthcare - Existing Technical Environment

**Hosting** - Multiple colocation facilities, one lease expiring soon

- **Apps** - Web-based, containerized on Kubernetes clusters
- **Data** - MySQL, MS SQL Server, Redis, MongoDB mix
- **Integrations** - Legacy file/API-based insurance systems on-prem (scheduled to be replaced)

**Identity** - Microsoft Active Directory

**Monitoring** - Open source tools (BUT alerts ignored often)





# EHR Healthcare - Business Requirements

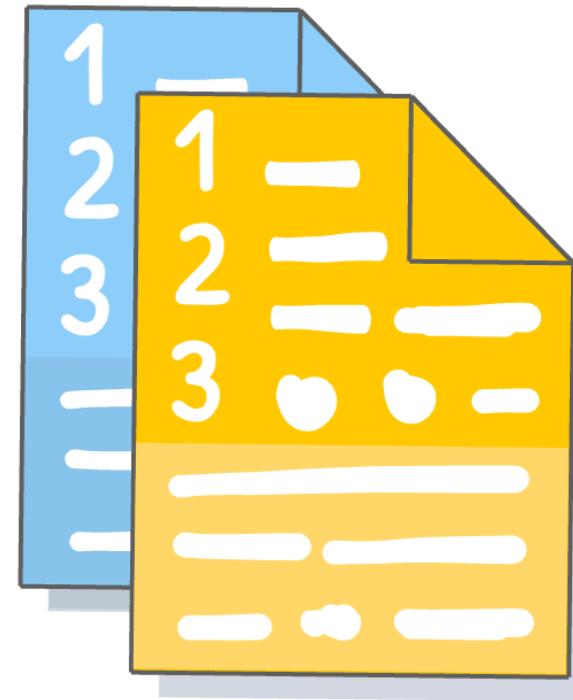
**Faster Partner Onboarding:** Add new insurance providers quickly

**Data Insights:** Generate healthcare trend analytics

**High Availability:** Maintain min 99.9% uptime

- **Global Reach:** Reduce latency - worldwide customers
- **Centralized Visibility:** Monitor system performance proactively

**Regulatory Compliance:** Maintain security and privacy standards





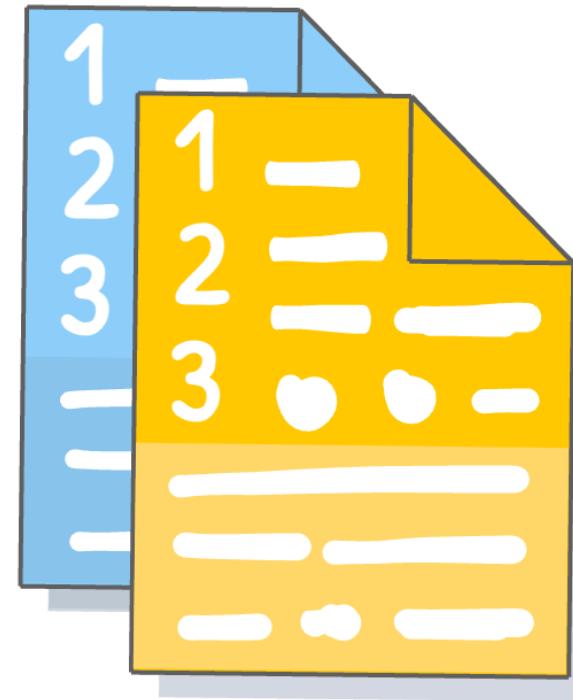
# EHR Healthcare - Technical Requirements

**Hybrid Connectivity** - Secure high speed link between on-prem and cloud (for legacy interfaces to insurance providers)

**Container Management** - Multiple environments with consistency

- **Scalability** - Auto scale environments
- **Observability** - Consistent logging, log retention, monitoring, and alerting capabilities

**Create New Provider Interfaces** - To ingest and process data





# EHR Healthcare - A Few More Details

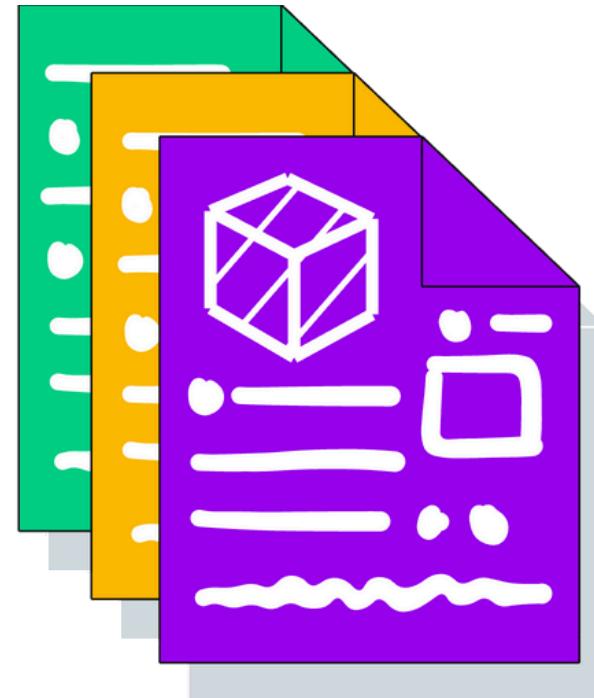
## Web-based customer-facing applications running on Kubernetes clusters

- Requirement: Consistent way to manage container apps
- Requirement: Manage multiple container-based environments

## Legacy file- and API-based integrations with insurance providers

- Scheduled for replacement over next few years - Will NOT be moved to Google Cloud

## Facing outages: With mis-configured systems





# Case Study - EHR Healthcare - Discussion [1/2]

Service	Discussion
GKE Enterprise	<p>Run Kubernetes clusters anywhere (cloud and on-premises)</p> <p>Config Mgmt - Central policies - Service Mesh, Access control</p> <p>Service Mesh (logging, monitoring, distributed tracing, dashboards)</p> <p>CI/CD - Watch for updates in the Git repository and applies changes to all relevant clusters automatically</p>
Databases	<p>MySQL, MS SQL Server =&gt; Cloud SQL (or Cloud Spanner or AlloyDB)</p> <p>Redis =&gt; Memorystore</p> <p>MongoDB =&gt; MongoDB Atlas</p>
BigQuery	<p>Make predictions and generate reports on industry trends</p> <p>Batch: Cloud Storage &gt; Dataflow &gt; (BigQuery, ....)</p> <p>Stream: Cloud Pub/Sub &gt; Dataflow &gt; (BigQuery, ....)</p>



# Case Study - EHR Healthcare - Discussion [2/2]

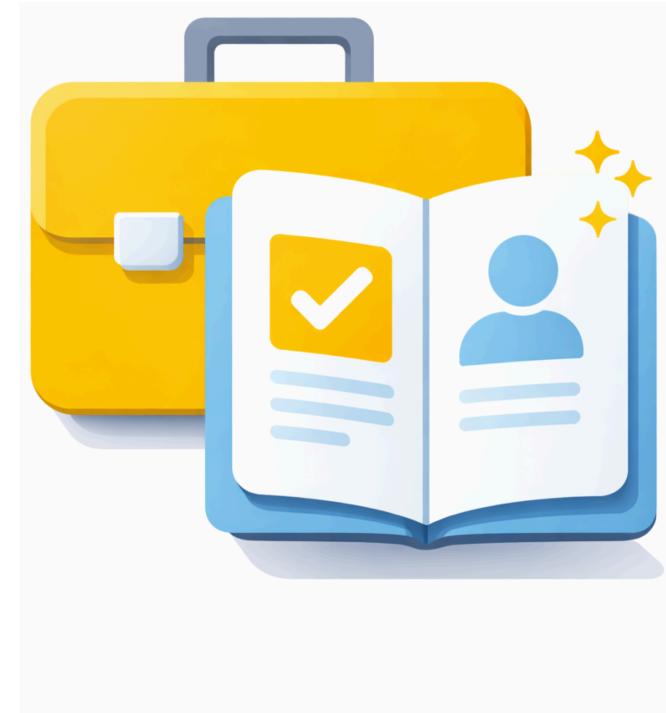
Service	Discussion
Active Directory Federation Services (AD FS)	For single sign-on Google Cloud Directory Sync (synchronize users and groups from Active Directory to Cloud Identity)
Cloud Dedicated Interconnect	Secure and high-performance connection
Cloud CDN	Reduced latency
Cloud Observability	Alerting Policies for Notifications
Cloud Logging > (Cloud Storage, BigQuery)	Log Retention

# KnightMotives Automotive Case Study - Overview



**KnightMotives:** Global car manufacturer specializing in self-driving vehicles

- **Product Range:** Battery Electric Vehicles (BEVs), Hybrids, & Internal Combustion Engine (ICE) cars
  - **Current Status:** BEVs feature modern in-vehicle systems, but hybrid and ICE models lag behind
  - **Challenge:** Outdated technology causing declining sales
- **5 Year Vision:** Modernize consumer experience
  - **Opportunity:** Use AI to transform in-vehicle, shopping, and service experiences
- **Strained Dealer Relationships:** Because of unreliable ordering system
- **Goal:** Enhance technology & dealer tools to enable built-to-order vehicles & better customer satisfaction



# KnightMotives Automotive - Executive Statement

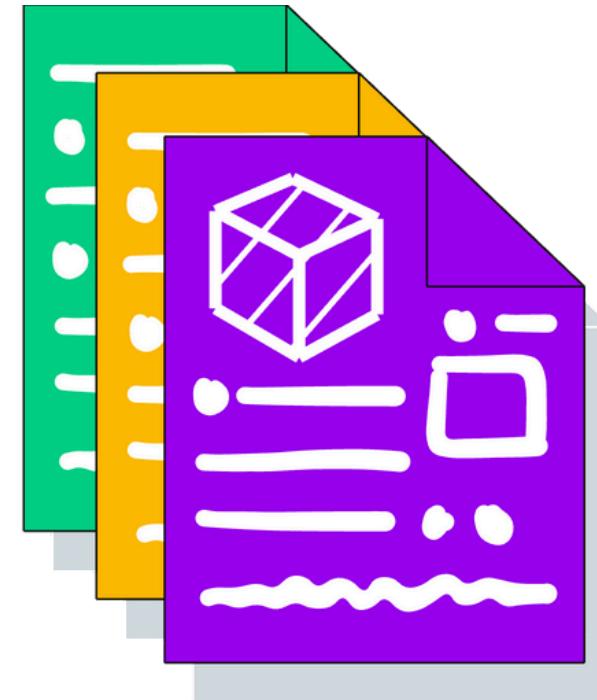


**Commitment:** Enhance safety and save lives through intelligent data use

- **Data Foundation:** Leverage driving behavior, road conditions, and crash statistics
- **AI Excellence:** Consistently outperform national safety benchmarks

**Unified Experience:** Deliver the trusted KnightMotives experience across all models

**Vision:** Create compelling, data-driven digital experiences for every driver





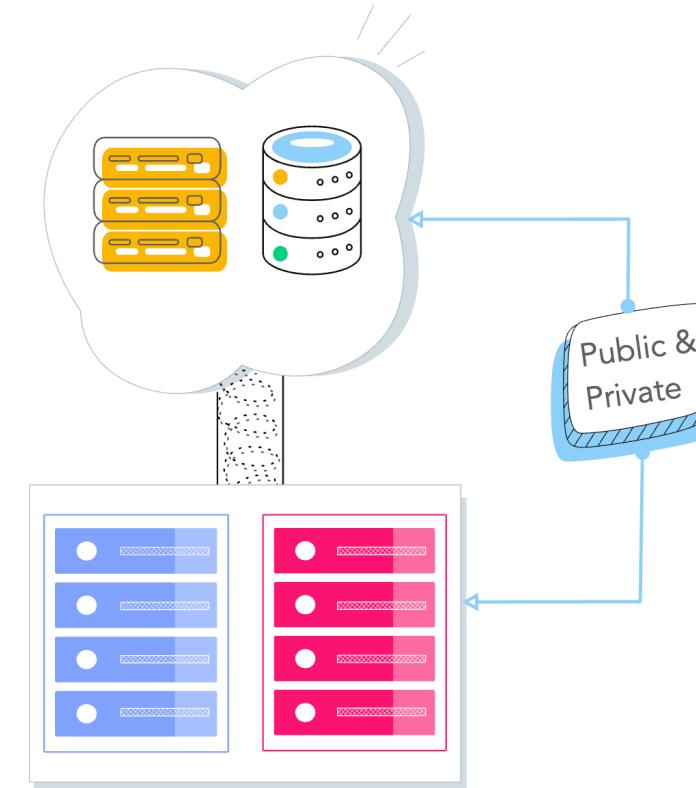
# KnightMotives Automotive - Existing Technical Environment

**Infrastructure:** Mostly on-premises with few workloads on major cloud platforms

- **Core Systems:** Supply chain runs on outdated mainframes, Enterprise Resource Planning outdated
  - **Problem:** Hard to launch new promotions & dealer discounts
- **Dealer Constraint:** Limited budget for h/w upgrades
- **Connectivity Gaps:** Unreliable links to manufacturing plants and rural vehicles

**Code Fragmentation:** Multiple code bases across vehicle models

- **Technical Debt:** Heavy backward compatibility requirements slowing innovation



# KnightMotives Automotive - Business Requirements



## Personalized Consistent Experience: Across models (build deeper relationships)

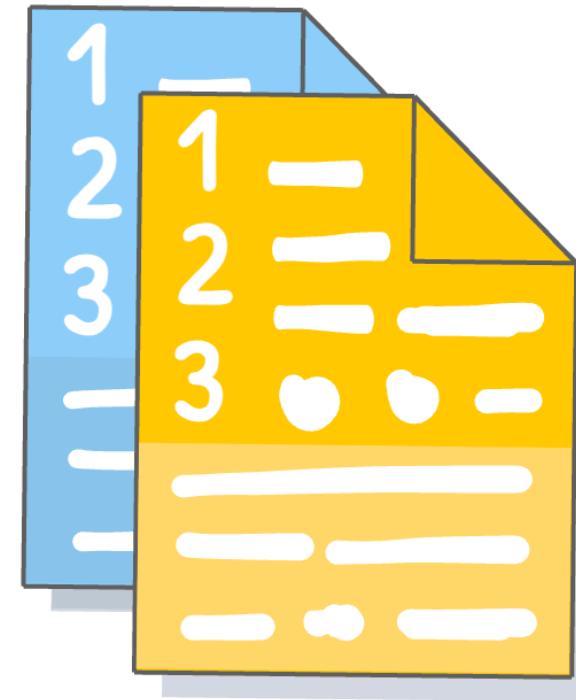
- **Goal:** Better build-to-order model
- **Expand:** Fully autonomous driving in favorable regions

## Data Monetization: Leverage corporate data

- Fund projects to fix AI infra. and siloed corporate data

## Security & Compliance: With EU data laws

## Workforce Enablement: Upskill employees, attract top technical talent



# KnightMotives Automotive - Technical Requirements

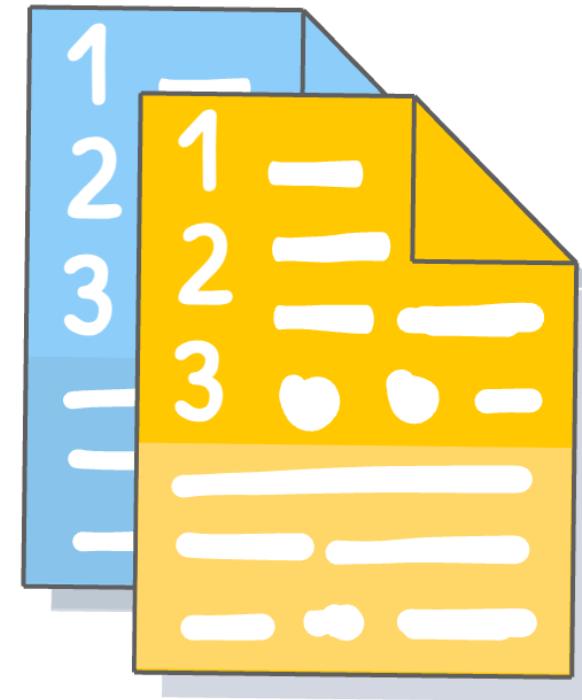


## In-Vehicle Experience: Unified AI-powered UX

- **Reliable Connectivity:** For rural vehicles
- **Autonomous Vehicle Development:** Invest in AI and simulation for testing and compliance

## Cloud Modernization: Hybrid strategy to modernize IT (& phase out legacy platforms)

- **Secure Data Platform:** For data management, monetization, and AI-driven analytics
- **Security & Risk Management:** Establish a framework
- **Dealer & Customer Experience:** Enhance build-to-order system, dealer tools, and CRM for seamless engagement



# KnightMotives Automotive - Discussion [1/2]



Service	Discussion
Android Automotive OS	Modern, connected in-vehicle infotainment & UX systems
Edge TPUs	Deploy ML models on vehicles for real-time decisions
Dialogflow	AI-powered voice assistants - in-vehicle interactions
Vertex AI Platform	Train, tune, and deploy ML models
HPC - Powerful GPUs & CPUs on GCE VMs	Simulate road conditions and driving behavior
Cloud Interconnect	Reliable connectivity for dealers, and vehicles
Pub/Sub, Dataflow	Handle streaming data from connected vehicles
BigQuery	Fix siloed corporate data and base for secure data platform
Sensitive Data Protection (Cloud DLP)	Anonymize data before storing it in BigQuery



# KnightMotives Automotive - Discussion [2/2]

Service	Discussion
Mainframe Connector	Integrate your mainframe data and apps with Google Cloud
Replatform Mainframe Applications	Mainframe apps can run "as-is" in Google Cloud on Compute Engine
Mainframe Assessment Tool	Assesses and reverse-engineers your mainframe apps and data - detailed code explanations, dependency insights, etc.
Google Gemini Code Assist	Mainframe Code Rewrite - Transform legacy mainframe code into modern languages
GKE (or Cloud Run)	Managed compute services for refactored mainframe code
API Gateway	Data Monetization. Unify legacy systems through secure APIs.
Security Command Center	Centralized multi-cloud security risk dashboard