



PROFESSIONAL CLOUD ARCHITECT

Cymbal Retail Case Study

Company Overview

Cymbal is an online retailer experiencing significant growth. The retailer specializes in a large assortment of products spanning several retail sub-verticals, which makes managing their extensive product catalog a constant challenge.

Solution Concept

Cymbal wants to modernize its operations and enhance the customer experience in three core areas:

- **Catalog and Content Enrichment:** Cymbal wants to automate and improve the accuracy of their product catalog by utilizing gen AI to generate product attributes, descriptions, and images from supplier-provided information. This solution will streamline their catalog management, reduce manual effort and errors, and ensure information is consistent across all their sales channels.
Vision AI
from Images generate
product attributes
Natural Lang AI
enrich content
from text
- **Conversational Commerce with Product Discovery:** To enhance customer engagement and drive sales conversion, Cymbal wants to implement a Conversational Commerce solution. This solution will involve integrating AI-powered virtual agents into their website and mobile app to provide customers with a personalized and intuitive shopping experience through natural language conversations. These agents will utilize Google Cloud's Discovery AI to process user requests and retrieve the most relevant products based on each customer's needs and preferences, creating a more engaging and satisfying shopping journey.
Conversational AI
Agents with
personalized
communication
with NLP
- **Technical Stack Modernization:** To streamline operations and reduce costs around manual processes, data transfer, error handling and remediation, Cymbal wants to modernize their technical stack with cloud-based infrastructure, secure and efficient data handling, 3rd party integrations, and proactive monitoring and security.
cloud Armor
Metrics Alerts Budgets
Quotas
encryption

Google Cloud

Existing Technical Environment

Cymbal currently relies on the following environment:

- A mix of on-premises and cloud-based systems.
- A variety of databases, including MySQL, Microsoft SQL Server, Redis, and MongoDB, to store and manage its vast product catalog and customer data.
- Kubernetes clusters to run containerized applications.
- Legacy file-based integrations with on-premises systems, including SFTP file transfers, ETL batch processing. [replace with Dedicated Interconnect](#)
- A custom-built web application which allows customers to browse the product catalog by querying the relational databases for names and categories of products.
- An IVR (Interactive Voice Response) system to handle initial customer calls and route them to the appropriate departments or agents. [use Conversational AI](#)
- Call center agents who receive transferred calls from the IVR system and manually enter orders into the system when a customer can't complete a transaction on their own.
- Various open source tools for monitoring such as Grafana, Nagios, and Elastic. [single monitoring dashboard](#)

[Cloud SQL](#),
[MemoryStore](#),
[Datastore](#)
[use App Engine](#)
[use Conversational AI](#)
[single monitoring dashboard](#)

The current technical environment has encountered significant challenges: manual processes are time-consuming and error-prone, data silos limit a unified view of the customer journey, and integrating new technologies is difficult.

Business Requirements

Cymbal has outlined these key business requirements for the gen AI solution:

[Natural Lang AI](#)
[enrich content from](#)

- **Automate Product Catalog Enrichment:** Reduce manual effort, minimize errors, and ensure accuracy and consistency across the product catalog. [Vision AI](#)
[from Images generate product attributes](#)
- **Improve Product Discoverability:** Enhance search relevance and enable customers to find products more efficiently. [Vertex AI Search: Personalizing search, recommendations, and browsing feeds that optimize content and product discovery](#)
- **Increase Customer Engagement:** Create a more interactive and personalized shopping experience to improve customer satisfaction and potentially reduce product returns. [Conversational AI Agents : Personalize experience](#)
[Natural Language AI : Training your open ML models to classify, extract, and detect sentiment](#)
- **Drive Sales Conversion:** Provide a more intuitive and helpful shopping experience to improve sales conversion rates and drive revenue growth.
- **Reduce costs:** Reduce call center staffing costs and data-center hosting costs. [conversational AI Agents](#)

Google Cloud

The solution leverages Vertex AI platform to address the image generation and enhancement requirements. Vertex AI platform is suitable for this task because it provides a unified platform for developing and deploying custom machine learning models, including generative AI models like Imagen, which are specifically designed for image generation and editing tasks such as creating variations, changing backgrounds, adjusting colors, and adding text overlays. While Vision AI focuses on analyzing existing images, Vertex AI platform with its generative capabilities directly addresses the need to create new image content and modify it.

Technical Requirements

- **Attribute Generation:** Accurately derive relevant product attributes from various supplier data, including titles, descriptions, and images, ensuring the attributes align with the product category and Cymbal's existing catalog structure. [Document AI](#)
- **Image Generation and Enhancement:** Generate different product image variations from a base image (e.g., showcasing various colors). It should also support background changes, product color adjustments, and the addition of text overlays. [Vertex AI](#)
- **Automate Product Discovery:** Process customer requests expressed in natural language and return highly relevant product results. [Vertex AI search](#)
- **Scalability and Performance:** The solution must handle Cymbal's extensive product catalog and accommodate their anticipated growth without compromising performance or user experience. [Cloud Spanner for growth in future](#) [For traffic distribution have a LB](#), [To track KPI have Cloud Monitoring](#) [Implement Identity-Aware Proxy to secure access to the applications that interact with Spanner](#), ensuring only authorized users can reach
- **Human-in-the-Loop (HITL) Review:** Provide a user interface (UI) for associates to review and manage gen AI-generated content, allowing them to approve, reject, or modify suggestions before updating the product catalog.
- **Data Security and Compliance:** Ensure all customer data, including product information and interactions with virtual agents, are handled securely and comply with relevant industry regulations. [Security Command Center , Assured Workloads, Sensitive Data protection](#)

Asset management : Use Cloud Asset Inventory to monitor and analyze Spanner instances and databases, providing visibility into resource configurations and changes.

Configure Assured Workloads to create an environment that enforces specific compliance controls and data residency requirements for your sensitive customer data.

Use Sensitive Data Protection to automatically discover, classify, and identify sensitive customer data across your Google Cloud resources, including data stored in Cloud Storage, Cloud SQL, and any data processed by Compute Engine or Google Kubernetes Engine.

Integrate Sensitive Data Protection with Security Command Center to continuously monitor your cloud environment for security posture issues, vulnerabilities, and active threats related to your customer data.



Executive Statement

By implementing Google Cloud's Generative AI for Digital Commerce solutions, Cymbal can transform its online retail operations to improve efficiency, enhance customer experience, and drive revenue growth. Key benefits for Cymbal include:

- **Reduced operational costs** through automation of catalog management tasks.
- **Increased efficiency and speed** in onboarding new products and updating existing ones.
- **Improved accuracy and consistency** of product information across all sales channels.
- **A more engaging and personalized shopping experience** that caters to modern customer preferences for conversational commerce.
- **Enhanced product discoverability** leading to higher conversion rates and increased sales.

This strategic investment in generative AI will position Cymbal to remain competitive and thrive in the rapidly evolving landscape of online retail.

Sample Question 2: Cymbal's customer and product data reside in several on-premises systems. They need a unified view for analytics and ML. What is the best approach?

A. Migrate all application databases into a single Cloud Spanner database to serve as a central source of truth for all data.

B. Set up continuous data pipelines (via Datastream and Dataflow) to replicate each source into BigQuery, creating a consolidated cloud data warehouse.

C. Use BigQuery federated queries to directly query the on-prem databases in place, avoiding data duplication.

D. Build an ETL pipeline that dumps data from each system into Cloud Storage each day, then load those into BigQuery manually for analysis.

Answer 2: B. Streaming all source data into BigQuery creates a unified, up-to-date warehouse for analytics.

A (move everything to Spanner) isn't practical or analytics-friendly, C (federated queries) is too slow and burdensome, and D (ETL) is error-prone and time-consuming.