



# Integrating GenAI with Existing Financial Systems on Google Cloud

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## Abstract

This research paper aims to study the interaction of Generative AI with other existing financial programs in the Google Cloud Platform environment. How GenAI could revolutionize finance across areas such as customer service and risk management is discussed, alongside the difficulties of implementing these and other next-generation models onto frequently outdated infrastructure. This paper explores these issues, such as data partitioning, compatibility with existing systems, concerns of security, and requirements for interpretability within the financial industry constraints. Based on GCP's strong fundamentals, analytics, and security, the study explores the optimal way to integrate them into a project. Topics discussed are data migration, using APIs, run time containers, and managing multi-cloud platforms. It is work that aims to present a reliable how-to guide for the implementation of GenAI on GCP for financial institutions. To do that while staying compliant with the regulations and secure data, the financial industry needs to become wiser and more efficient.

Keywords: Financial Applications, Generative AI, cloud platforms, cloud and integration platforms, legacy modernization, data security, compliance with regulations.

## 1. Introduction

Generative AI is a new area for corporative fin services in the upcoming revolution. Being relevant to numerous areas, it is possible to discuss the changing potential of GenAI in the finance and services industry, where the key directions are customer care, fraud prevention/detection, risk assessment, and investment. However, it should be noted that it is impractical to achieve the further potential of GenAI until its integration of legacy financial systems and data repositories, which are still many in number using legacy systems. This integration poses some difficulties, especially when it comes to the effect of institutional factors that define the complexity of the financial sector environment for higher education institutions [1].

That is why the Google Cloud Platform is considered the most suitable for financial institutions to create a reliable, scalable, and secure environment for using GenAI capabilities. According to Cao (2020), the prospect for growth and issues that arise when implementing GenAI models into base monetary systems on GCP, along with a template for monetary organizations interested in using Lev Gen innovation [4].



Namely, it addresses the problems of integrating GenAI models into the current financial systems implemented in the Google Cloud Platform environment. The GCP platform has a secure infrastructure for hosting and scaling up GenAI solutions with a major feature of big data analysis and security. This paper aims to discuss some critical aspects concerning the integration of BI and Hadoop: data separation, compatibility with legacy systems, security, and interpretability.

## **2. Literature Review**

The research about combining GenAI directly into existing financial elements of Google Cloud is emerging, but studies across multiple domains supply framework understanding for this emerging field. Examining existing research combines findings from financing AI studies alongside analysis of cloud integration approaches, legacy system transformer practices, and financial sector data protection developments to build this overall study [16].

Academic research about GenAI's finance applications demonstrates how these technologies can reshape financial operations while considering their associated difficulties. As outlined in [8], GenAI enables diverse financial applications across customer interaction points alongside strategic investment frameworks yet struggles to merge with present-day systems. The inherent risks within GenAI systems, along with their financial sector impact, require immediate study [13,18].

### **2.1. AI in Finance**

Published work reveals comprehensive insights about AI applications in finance, which establish knowledge of GenAI's potential for finance. A recent pair of papers focused on AI in finance examines financial applications extensively, such as trading algorithms, fraud prevention systems, and risk assessment tools. In his research, Veloso [14,16,17] explores concrete instances of AI financial service implementations that showcase automatic sophistication and customized client assistance. These findings establish fundamental knowledge about how GenAI fits into its larger operational framework. This study examines the future of GenAI in finance while exploring its benefits alongside obstacles researchers must overcome [8].

### **2.2. Cloud Integration and Legacy Systems**

Current research examining cloud integration approaches and legacy system transformations provides essential comprehension for GenAI model integration. The critical role of APIs in exposing legacy applications becomes the focus because legacy systems need modern GenAI tools through cloud connectivity. Legacy tool restoration through Generative AI methods in financial services, potentially leading to updates. These studies furnish relevant methods to integrate new technology with existing infrastructure, even though they lack explicit GenAI analysis.



The paper explores cloud computing trends and challenges while presenting an overview of various sectors as part of cloud adoption, specifically in finance [9].

### **Data Security and Regulatory Compliance**

Research on financial data security and regulatory compliance standards provides essential information about how General AI integration needs to function in this field. The study of (Cloud Financial Services, 2024) evaluates cloud financial services in general, though it specifically emphasizes security. Researchers must investigate how using GenAI in financial settings on cloud platforms affects security and privacy specifications. This paper [2] explores research integrity alongside the ethical challenges of GenAI tools that are salient for financial software development.

### **2.3. Generative AI and Software Engineering**

Integrating Generative Artificial Intelligence into software engineering research reveals essential details about adopting broader GenAI systems. Their systematic literature review [7] demonstrates how GenAI enables significant advantages throughout the requirements engineering stages. While Generalized Artificial Intelligence (GenAI) stands outside finance-specific applications, this study provides beneficial insights into system complexity integration challenges. Platform deployment issues with computational-intensive machine learning models receive analysis, specifically for GenAI financial applications [5].

### **2.4. Google Cloud Platform and AI**

As discussed in this text, GCP is widely known for its documented cloud computing and Artificial Intelligence solutions in the academic field. Vertex AI serves as GCP's platform for machine learning and AI capabilities, offering a full set of instruments to develop, deploy, and manage general Artificial Intelligence models [10]. The review demonstrates existing research practices surrounding GenAI implementation within existing financial systems hosted on Google Cloud. Existing research about this topic remains uncommon, but the examined literature creates a solid basis demonstrating the integration challenges alongside successful practices and possible opportunities. The integration of GenAI into finance requires additional scientific investigation to establish its precise implications regarding financial systems and security measures, along with privacy and regulatory standards [6-7].

### **2.5. Generative AI in Finance: Opportunities and Challenges**



The financial industry is on the verge of transforming through the widespread adoption of Large Language Models among Generative AI applications [15]. GenAI models enhance multiple financial operations, including customer interactions, asset evaluation, fraud protection, and business threat identification. The human-like content generation of GenAI joins forces with image and code creation features to automate mundane work processes while improving organizational decisions through innovation.

Financial systems experience major barriers during their integration process with GenAI technologies. The integration of GenAI proves challenging for financial institutions because they run their operations on outdated systems and disconnected data repositories [11], while adherence to regulatory standards and data protection, along with interpretability needs, make the process more complex. Understanding GenAI integration requires financial institutions to develop strategic and systematic implementation methods.

The field of finance holds multiple possibilities derived from Generative Artificial Intelligence technologies [8]. Generative models elevate customer experience through personalized interactions while streamlining repetitive tasks and providing synthetic data for stress testing risk modeling. Financial institutions must create a strategic plan to integrate avant-garde artificial intelligence models while facing multiple obstacles, such as isolated data clusters and system integration problems with data privacy risks and regulatory compliance requirements.

### **3. Leveraging Google Cloud Platform for GenAI Integration**

Financial institutions will find that the Google Cloud Platform makes an attractive infrastructure for combining GenAI models with their existing operational systems. For financial organizations, GCP provides a strong infrastructure, advanced analytics features, and secure systems that create a compelling solution [15] [8].

GCP delivers a major benefit through its automated process, which links traditional systems with current infrastructure solutions. GCP provides Cloud Data Transfer as part of its data migration services, supporting safe and efficient data transfer from local premises to cloud infrastructure [15]. Big Query from GCP's serverless data warehouse platform enables financial institutions to unify data across different sources, streamlining crucial access and analytic capabilities.

GCP solves legacy system compatibility issues by providing Apigee API Management that lets financial institutions deploy secure APIs to connect their GenAI models to existing financial platform applications.

### **4. Ensuring Data Security and Regulatory Compliance**

Financial institutions attain data security and adhere to regulatory compliance through GCP's extensive security capabilities which include encryption technologies and access permission systems along with performance



tracking functions [12]. GCP's Vertex AI platform provides embedded tools for model interpretability, including feature importance analysis and model explainability capabilities essential for the financial industry. GenAI models from financial institutions achieve transparency through built-in capabilities that maintain accountability while ensuring regulation compliance [15].

## 5. Conclusion

Professionals need to address critical hurdles and broad possibilities when implementing Generative AI systems in financial services operations. The capabilities of Google Cloud Platform assist financial institutions in managing complex environments while enabling them to achieve the substantial potential of GenAI [8]. GCP's secure foundation comprises robust infrastructure, data integration tools, and security features that establish a successful framework for GenAI model deployment within financial services. Foreseeing the full transformative power of this technology requires ongoing research coupled with the finance industry and technology provider collaboration to aid the continued adoption of GenAI.

The successful implementation of GenAI in finance depends on solving emerging problems relating to legacy system modifications alongside data protection requirements, regulatory compliance, and model explanation capabilities. Future development of GenAI systems depends on sustained academic research, industry cooperation, and governmental regulatory support to establish responsible and effective technology integration in the financial sector.

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