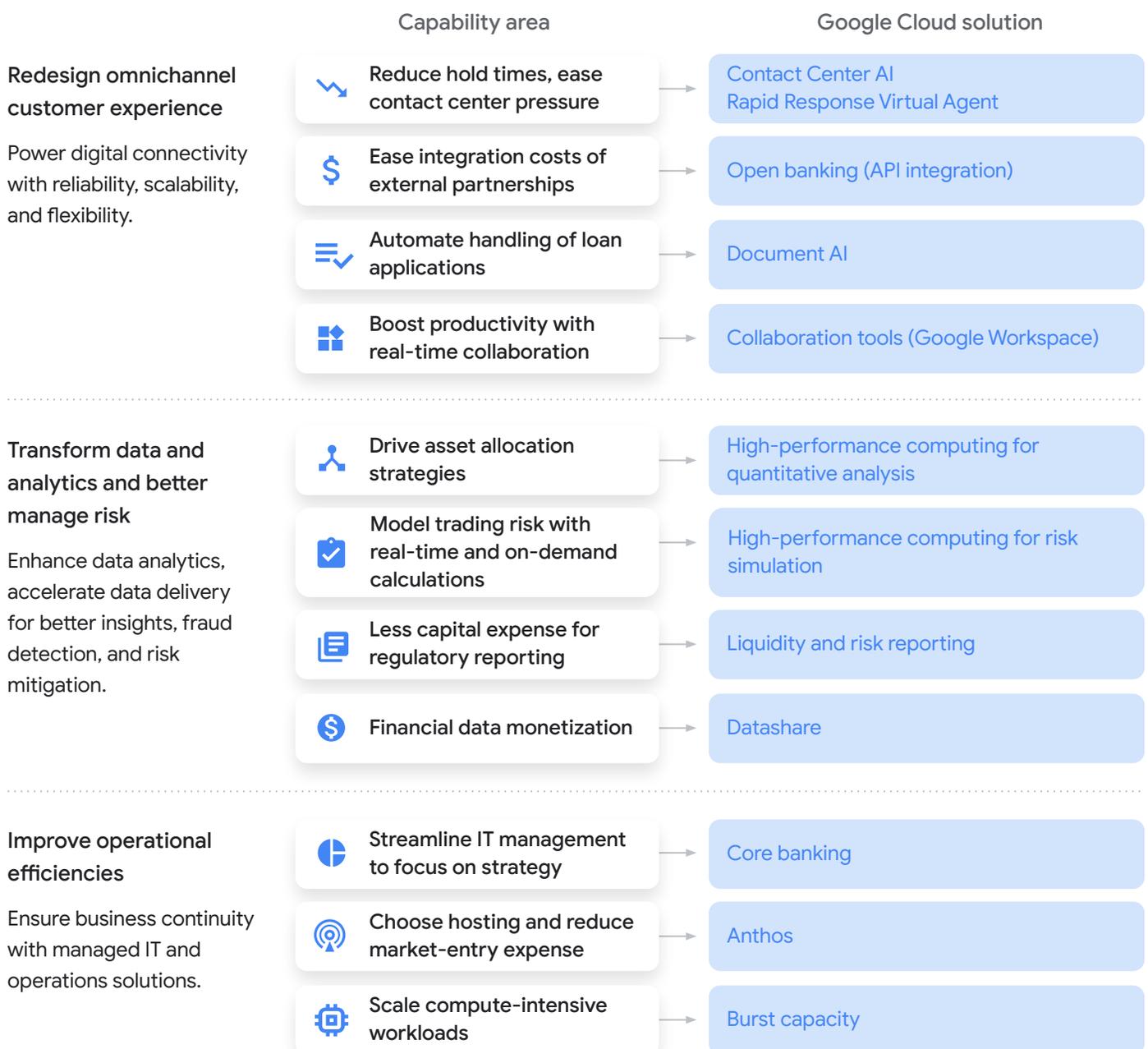


# Financial services transformation with Google Cloud

Google Cloud can help financial services firms accelerate innovation in three key areas:



## Why Google Cloud for financial services



### Best-in-class security

With Google Cloud, financial services institutions own their data and maintain control over where it is stored, processed, and transmitted. The data stays encrypted at all times, and privacy practices are audited against international standards.



### Multi-cloud choice and flexibility

With Google Cloud, financial institutions can develop applications once and run and access them across multiple cloud providers and on-premises environments. Rapidly bring new products to market and release updates easily with a more efficient development process.



### Leveraging the power of data

Gain instant insights from your data that lives anywhere. With Google Cloud, financial institutions can take advantage of high-performing, easily accessible tools to derive insights from market, customer, or proprietary data.



### Industry leader in AI/ML

Tap into AI/ML to make faster and more accurate decisions. Google Cloud's industry-leading AI and ML solutions allow financial institutions to better understand customers, uncover market trends, perform predictions, and identify transaction anomalies to detect fraud and mitigate risk.



### Best of Google

From Google Ads to Maps, you can apply technology from across Google to innovate and help transform your financial services organization. Help functions across the organization drive a culture of innovation.



### Commitment to sustainability

Financial institutions that move to Google Cloud can greatly reduce the net emissions associated with their compute and data storage. Meet your public sustainability commitments and reduce the environmental impact of IT operations.

## HSBC partners with Google Cloud to ease call burden on policy experts

HSBC, a global giant in commercial and personal banking, manages complex financial regulations from countries around the world. To help their policy experts manage tens of thousands of internal calls related to the bank's regulatory frameworks and policies, HSBC partnered with Google Cloud to develop The Operational Risk and Resilience Application (ORRA) chatbot, thereby reducing the time policy experts spend on manually intensive, internal queries.

### The challenge

HSBC employs 226,000 people and operates in 64 countries. Because each jurisdiction contains a different regulatory framework, HSBC employees seek the advice of internal policy experts before engaging in business decisions. As call volume to these experts increased, several challenges emerged.

The policy team could spend significant time navigating internal documentation to respond to callers or they could be asked the same question multiple times. In addition, time zone differences could result in delays, and answers could vary from one expert to the next. HSBC needed a way to reduce the time policy experts were spending on manually intensive queries, improve the consistency of policy response, and better understand what kinds of questions were being asked.

### The solution

HSBC worked with the customer engineering team at Google Cloud, along with KPMG's Innovation Division, to create Operational Resilience and Risk Application (ORRA), a FAQ and document search-enabled chatbot. ORRA performs dynamic document search and powers natural conversations with Google Cloud Dialogflow, a core component of Google Cloud Contact Center AI. Easily accessible to all employees from the HSBC intranet, ORRA conversationally answers queries on internal policy and framework areas applicable across the bank.



#### Answer questions quickly and consistently

ORRA's architecture includes an inhouse document search capability which returns search responses through a friendly user interface (UI). Business users can interrogate large documents for supplementary answers in milliseconds – all through the same UI.



#### Uses machine learning to inform decision making

ORRA learns from every conversation, analyzing the type, frequency, and source of queries, such that HSBC can better decide if any policies are due for simplification or revision.



#### Creates conversation architecture that scales across the organization

As ORRA accommodates more policies and documents, it can automate more answers to frequent questions and be enhanced to support more languages, mobile interactions, and speech.

## Why Google Cloud

HSBC selected Google Cloud as a strategic partner because of Google's AI and machine learning expertise and design-thinking approach to digital transformation. In this case, Google Cloud's Dialogflow enabled time savings and feature-rich solutions for a large scale conversational bot. HSBC will partner with Google on more industry-leading technology innovation and plans to evolve its cloud-based chatbot technology to get faster, more accurate answers to customers.



### The results



#### More efficient responses

ORRA helps automate the top questions employees ask and automatically tailors results based on a caller's geography.



#### Faster speed to information

By allowing policy experts to search internal documents using Natural Language Processing, they can find information quicker and respond to callers faster.



#### Greater productivity

Immediate, accurate policy information frees up time for policy experts to focus on adding value in more complex areas of their jobs.



People go out and use Google to answer questions every day and receive instant, precise responses. Similarly, we're now getting information to users in a way that feels familiar to them without having to read through an entire policy document."

**Steve Suarez,**  
HSBC's Global Head of  
Innovation, Finance & Risk

## USAA and Google Cloud work together to speed auto claims

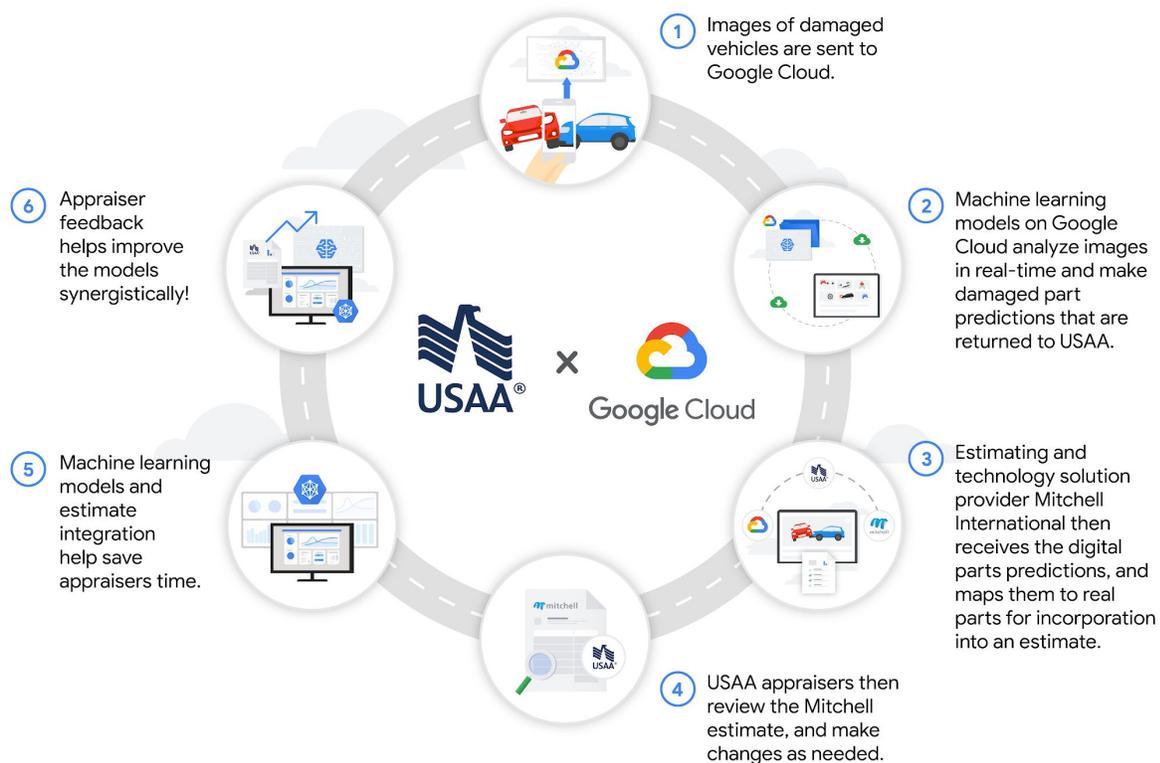
USAA, a financial services provider to U.S. military personnel and their families, is driven by its mission to offer the best member experience. In an effort to transform the auto claims experience, USAA partners with Google Cloud to create machine learning models that instantly assess vehicle damage from digital images, thereby helping to improve the accuracy of cost estimates and reduce the time to payment.

### The challenge

An auto damage claim is a critical moment for customer retention: a poor experience can lead to switching insurers whereas an excellent experience can lead to longtime loyalty. Historically, auto claims have been a time-intensive, laborious process. A claims adjuster needs to physically inspect each vehicle, determine the parts that need replacement, and understand the labor required for repair. The appraiser then submits a report to the insurer, who must approve the estimate before sharing it with the repair shop and car owner. This process can sometimes take weeks from beginning to end, which can negatively impact customer satisfaction.

### The solution

USAA partnered with Google Cloud to expedite the claims process. After a fender-bender, appraisers photograph the damage and upload the images to Google Cloud, where USAA can use machine learning to predict the damaged parts that will need to be repaired or replaced. USAA sends the predictions to software company Mitchell International, which has a platform that converts the predicted damaged parts into an actual cost estimate. That estimate is sent back to USAA for appraisers to review and make adjustments, and the feedback is incorporated into future models to improve accuracy.



## Why Google Cloud

Google Cloud's deep expertise in AI and machine learning technology and long history of creating customer-centric experiences enabled a strong partnership with USAA. The organization plans to streamline the claims process further with more features, so that eventually the majority of routine assessments will be touchless—allowing appraisers to focus their time and energy on more complex cases.

### The results



#### Faster claim speeds

USAA can reduce claims processing time and pay out members sooner.



#### Customer convenience

USAA can deliver a touchless claims experience for millions of claims a year.



#### Cost-efficiency savings

The new, cloud-based process will allow for more cost-efficient estimates.



#### Ongoing improved accuracy

USAA can predict damage more accurately across a diverse vehicle set as more examples are analyzed.



This technology now gives claims teams the opportunity to focus more deeply on connecting and providing guidance to our members. Innovation at USAA is not about technology for the sake of technology. It's about enabling our businesses to keep pace with member expectations and needs, while maintaining the level of service our members deserve.”

Ramon Lopez,  
Vice President of Auto Claims Operations,  
USAA

## Delivering real-time market data at scale with Google Cloud

As the world's leading and most diverse derivatives marketplace, CME Group is where the world comes to manage risk. CME comprises four exchanges—CME, CBOT, NYMEX, and COMEX—and offers the widest range of global benchmark products across all major asset classes, helping businesses everywhere mitigate the myriad risks they face in today's uncertain global economy.

### The challenge

As the world's leading derivatives marketplace, CME Group understands its customers rely on having the right data to respond instantly to global, market-moving events and mitigate risk. To respond to this need, CME had to reimagine how its customers receive real-time market data directly. Partnering with Google Cloud, CME Group wanted to disrupt the 20-year-old data connectivity and delivery model and make it easier for its customers to immediately access data directly from anywhere in the world.

### The solution

In 2019, CME Group launched real-time market data delivery via Google Cloud, which allowed its customers to access market data from anywhere with an internet connection. The solution included three components:



#### Flexible access to data

With Google Cloud, CME now delivers data on demand, whenever and wherever customers need it. Google Cloud Platform facilitates the exchange and monetization of both historical and real-time market data within the cloud—all at scale, securely and easily.



#### Customized plans for data consumption

CME offers customers an on-demand, pay-as-you-go model for market data consumption. Google Cloud provides an industry-first, hourly usage fee model aligned to cloud-computing paradigms.



#### Ease of data access

CME brings data to more customers by reducing the operational overhead necessary to receive market data from exchanges. This replaces traditional access methods that require provisioning servers and managing infrastructure.

## Why Google Cloud

Streaming market data via the cloud provides a wide range of benefits for data consumers, such as having fast, easy and flexible access to tremendous amounts of data. CME also chose Google Cloud for its Pub/Sub real-time messaging service, allowing CME customers to receive messages and data through more than 20 computing locations globally. This service removes the complexity, expense, and operational overhead of receiving real-time market data.



### The results



#### Improved value for its customers

With Google Cloud, CME makes accessing market data more economical, enabling CME to provide access to market data for about 10% of the cost of traditional means. This potentially saves its customers thousands of dollars a month, depending on the customer location.



#### Access to new customers

On Google Cloud, CME is able to reach new customer segments by offering access to CME market data on demand in a pay-as-you-go model for consumption.



#### Global reach of real-time data

With the Google Cloud Pub/Sub solution, CME can now provide customers with access to market data through more than 20 computing locations around the world.



This innovative collaboration with Google Cloud will not only make it easier for our clients to access the data they need from anywhere with an internet connection, but will also make it easier than ever to integrate our market data into new cloud-based technologies.”<sup>1</sup>

Trey Berre,  
Global Head of Data Services,  
CME Group

<sup>1</sup> <https://www.prnewswire.com/news-releases/cme-group-to-offer-real-time-market-data-via-google-cloud-platform-300937980.html>

## The benefits of moving a data warehouse from Teradata to Google Cloud

KeyBank, a subsidiary of KeyCorp, is a regional bank headquartered in Cleveland, Ohio. With approximately 17,000 employees and 3.5 million customers, KeyBank is the 19th-largest banking institution in the United States, with assets of about \$171 billion and growing.

### The challenge

In need of a data lake architecture (a single data repository that combines multiple databases into one environment) to serve its 3.5 million customers, KeyBank decided to shift from on-premises to cloud-based processing for added capacity, speed, improved analytics capabilities, and reduced cost. KeyBank was running analytics in a Teradata environment, but when its data warehouse hit the limits of what it could do, the bank decided to move quickly to the cloud.

### The solution

Change management was critical to KeyBank's migration to the cloud—shifting established patterns and use cases, and investing in training and certifications for analysts—to maintain focus on business priorities and customer relationships. KeyBank worked closely with the Google Cloud security team to meet requirements in a seamless migration process.



#### Creating flexible capacity options

Options for virtually unlimited capacity came in the form of flexible pricing models, allowing KeyBank to scale up for a month if needed during peak times, and then scale down to manage cost. Google trained users on the best ways to use the new model.



#### Highly scalable, cost-effective, and secure data

To make sure KeyBank's services and processes could communicate with BigQuery datasets, Google's security team tested five data marts against real-world data volumes. The team also aligned data formats to ensure that personally identifiable information was stored securely and tokenized.



#### Onboarding new users

Google worked with KeyBank to transition 400 users to the new tools and platform, including creating a charter with cross-functional leaders to focus training on KeyBank business priorities. Google provided training to analysts so they could learn the system and provide feedback.

## Why Google Cloud

KeyBank needed to move its maxed out, on-premises data warehouse operations to the cloud. After running performance testing among various cloud providers, it determined that Google Cloud met all the required parameters and provided the desired technology. As a result, KeyBank chose Google Cloud for its simplicity, abundance of options, and long-term growth potential.



### The results



#### Flexible usage for realized cost savings

The Google Cloud pricing model enables KeyBank to scale up or down according to monthly needs and stop paying for unused storage. Google Cloud's flexibility allows KeyBank to experience a fast time-to-value with significant ongoing cost savings.



#### Increased performance and speed

Since moving to Google Cloud, KeyBank now experiences query performance speeds up to **4x faster** than its previous system, enabling KeyBank to make smarter decisions faster and provide a better overall customer experience.



#### Improved analytics with reduced operating costs

Google Cloud provides lower cost per query than Teradata did. Using BigQuery, KeyBank can do more with analytics in place now, rather than the previous process of copying, storing, manipulating data, and then creating a report.



With an on-premises data warehouse like Teradata, you govern in capacity, so performance varies based on the load on the hardware at any given time. That led to analytics users hitting the limits during month-end processing, for example. With Google Cloud, there are options for virtually unlimited capacity.”

Michael Onders,  
EVP Chief Data Officer, Divisional  
CIO and Head of Enterprise  
Architecture, KeyBank

## From recovery to reinvention with Google Cloud

Equifax is a global data, analytics, and technology company providing customers with insights that power decisions for millions of people and companies in 24 countries around the world. As an innovative company that enables access to credit, it serve as a consumer advocate, steward of financial literacy, and champion of economic advancement.

### The challenge

In 2018, Equifax brought in new leadership to regain the market's trust by renewing the company's focus on data security, technology, and how it serves customers. The company's transformation is not a refresh or an upgrade, but a complete rebuild. Facing technical debt, data and department silos, and legacy infrastructure limitations, the company needed to remove internal complexity and decrease operating inefficiencies.

### The solution

Equifax started its transformation journey by making a \$1.5 billion investment, the largest in its history, to become a cloud-native data, analytics, and technology company with industry-leading security. Equifax partnered with Google Cloud in the following three areas:



Unified “data fabric” of multiple, disparate databases

Built with Google solutions such as BigQuery, Compute Engine, and Dataflow, Equifax developed a “data fabric” that includes multiple databases in one environment to enable innovation, insights, and analytics. Equifax can now organize data into a seamless structure, while still keeping critical governing and separation measures.



Enhanced data protection and security

Equifax incorporated more sound data governance policies and key infrastructure changes, including network firewalls, intrusion prevention systems, and row/column-level security. The addition of more robust identity and access management policies and procedures, such as identity management and enhanced encryption, provides extra layers of data protection and security.



Innovation driven by customer experience

With Apigee, Document AI, Contact Center AI, and Anthos, Equifax is on the leading edge of Google technologies, which it uses to build better experiences for customers and to develop innovative capabilities in core business areas like fraud, identity, know your customer (KYC), and anti-money laundering (AML).

## Why Google Cloud

Equifax chose Google Cloud because of its data and analytics focus, engineering excellence, and commitment to security. After assessing its needs, Equifax realized that Google's tighter focus around data, security, AI, and machine learning were a better fit than competing solutions, and that Google Cloud was the right partner to help achieve its goals.



### The results



#### Realized time-to-value

Equifax is on pace to realize **\$240 million** in savings from its digital transformation by the second half of 2021.



#### Reduced time-to-market for new products

With the new unified data fabric, Equifax is now able to get new products to market **10% faster** than before migrating to Google Cloud. The data fabric enables better access to data so the company can analyze big data sets faster, gain insights, and make informed business decisions.



#### Operating at scale and with agility

Being able to simultaneously rebuild, migrate customers, and launch products is proof that Equifax is taking full advantage of cloud scale, which was not possible with legacy infrastructure. With the agility of Google Cloud, Equifax can send data to customers **multiple times a day** instead of only once a month or once a week.



“[We] felt that Google Cloud offers a differentiated approach to data that was completely unique and did not seem to be available at other companies. And Google has really been there for us with a commitment of lining us up with the right people to help us achieve success not just in usage but also with the outcome.”

Bryson Koehler,  
CTO, Equifax

## Delivering scale, agility, and trust with Google Cloud

Goldman Sachs, a 150-year-old global investment banking, securities, and investment management firm, is using Google Cloud infrastructure to enable secure growth, agility, and the trust of its institutional clients.

### The challenge

Goldman Sachs has pioneered financial mathematics on Wall Street. Historically, the firm held insights that it garnered from its own technology within its own four walls. Over time, Goldman Sachs started sharing those insights with its clients. It required building brand-new businesses in new spaces and gaining more agility to adapt to rapidly evolving client needs.

### The solution

Goldman Sachs is using Google Cloud to enable secure growth, agility, and the trust of its clients. By delivering massive compute power and near-infinite scale, Google Cloud is helping the global firm focus on new challenges, evolve quickly, and deliver innovations to serve its clients' needs in an ever-changing economy. The high performance computing (HPC) solution focused on two areas:



#### HPC for risk and compliance

Goldman Sachs uses Google Cloud's HPC capabilities to measure, factor, analyze, and monitor risk across the firm. With Google Cloud, Goldman Sachs can get resources it needs to calculate and simulate risk, in real time or on-demand, without building the server farm.



#### HPC for client analytics

By taking advantage of high performance computing in Google Cloud, Goldman Sachs can bring advanced insights to its institutional clients to keep up with market movements, ensure financial control, and make better informed trading decisions.

## Why Google Cloud

Goldman Sachs is more of a technology company than a bank. In fact, one in four people at the firm is an engineer. It sees the partnership with Google Cloud as conferring the superpowers of both organizations. Goldman Sachs needed to consume a lot of compute power, and it chose Google Cloud's HPC capabilities for reliability, scalability, and price-performance optimization.



### The results



#### Improved value to its clients

With Google Cloud, Goldman Sachs can offer its institutional clients closer proximity and more direct access to its risk analytics services.



#### Scalable, efficient risk calculations

With Google Cloud's HPC resources, Goldman Sachs can measure, factor, analyze, and monitor its own risk without building a server farm.



#### Promotion of an engineering culture

Through this partnership, Goldman Sachs can leverage the superpowers of its people to better understand data, express ideas, and be more engaged with clients.



“As Goldman Sachs thought about scaling its own business and how much more intense that risk management activity could become in the world, Google Cloud was an obvious choice.”

George Lee,  
Co-Chief Information Officer,  
Goldman Sachs

## Creating trust in the markets of today and tomorrow

Headquartered in Frankfurt, Germany, Deutsche Börse Group is an international exchange organization and market infrastructure provider offering customers a wide range of financial market products, services, and technologies. Business areas include pre-trading (indices, market data, investment trading, settlement services), trading and clearing (settlements of investment instruments), and post-trading (securities custody, collateral, liquidity management services) services.

### The challenge

Deutsche Börse Group takes pride in building and providing safe and efficient infrastructure and IT solutions for capital markets to operate in, including Germany's largest exchange, the Frankfurt Stock Exchange. In 2017, the group embarked on a new growth strategy that outlined the adoption of a cloud infrastructure and powerful new analytics and AI tools to improve agility and drive efficiency.

### The solution

Deutsche Börse's unique requirements for scale, security, and portability led Deutsche Börse to focus only on the world's leading infrastructure providers, including Google Cloud. The solution included three components:



#### New regulatory audit framework

When Deutsche Börse first decided to use Google Cloud as one of its earliest cloud vendors, the group had to come up with a legal framework for the move to the cloud. In 2019, Google Cloud was invited to take part in an audit with multiple financial institutions, as part of the Collaborative Cloud Audit Group. The audit with Google Cloud was a success and laid the regulatory groundwork for Deutsche Börse to go deeper into the cloud.



#### Portability between on prem and the cloud

With the audit complete, Deutsche Börse has started migrating workloads to Google Cloud as part of its new multi-cloud infrastructure. A key pillar of the group's cloud strategy: ensuring portability and freedom of choice. To that end, it adopted Google Cloud VMware Engine to have the scalability and resilience of the cloud without needing to change existing VMware instances.



#### Innovation through AI and analytics

Now that Deutsche Börse is relying on Google Cloud infrastructure, it is concentrating on innovation through AI and analytics. With Google Cloud, Deutsche Börse is not just meeting the regulatory demands of the finance world, it is meeting its own ambitions to scale further and use technology to innovate in the industry.

## Why Google Cloud

Innovation has been at the heart of Deutsche Börse since it pioneered electronic and high-speed trading in capital markets in the early 1990s. This partnership helps Deutsche Börse unlock further potential with cutting-edge analytics and AI tools.

### Looking ahead



#### Data-driven product innovation

Google Cloud will enable Deutsche Börse to automate selected operations and reinvest time saved into developing new data-driven products for its customers.



#### Flexibility and auditability

Google Cloud will provide greater flexibility to manage cloud infrastructure operations, thus faster responsiveness for users. It also will serve as a compliance partner to help Deutsche Börse problem-solve the auditability of its platform.



#### System modernization

Google Cloud will help modernize Deutsche Börse's systems by providing tools to improve central business' end-to-end processes. Speedy VM migration using Google Cloud VMware Engine, will ensure portability between and across clouds.



With Google Cloud, we're not just meeting the regulatory demands of the finance world, we're meeting our own ambitions to scale further and use technology to innovate in our industry. We see Google Cloud as an ideal partner to unlock further potential, both for our company and our customers."

Michael Girg  
Chief Cloud Officer, Deutsche  
Börse Group

## Historical tick data and faster analytics via Google Cloud

Refinitiv is a global provider of pricing and trading market data and infrastructure. The company recently launched its Tick History dataset on Google Cloud, allowing customers to access, query, and analyze the company's extensive archive of pricing and trading data using BigQuery machine learning (ML) capabilities.

### The challenge

Refinitiv clients needed to analyze the pricing and trading of over-the-counter (OTC) and exchange-traded instrument data in more than 500 venues dating back to 1996. Previously, this required specialized infrastructure and storage capacity to access the data, adding significant cost to its customers' efforts, as well as time spent waiting for data delivery and aggregating the data.

### The solution

Using the machine learning capabilities of Google Cloud BigQuery, Refinitiv launched Tick History, a dataset hosted on Google Cloud that enables customers to access, query, and analyze extensive pricing and trading data drawn from real-time content. The combination of Refinitiv's managed service database and Google's managed compute cluster allows customers to work across large datasets remotely and in a fraction of the time it would take otherwise.



#### Purpose-built product development

Tick History is built on Google Cloud Platform, which provides on-demand delivery of all of Refinitiv's 70,000 active and retired securities through a web-based interface.



#### Rich analytics

Google Cloud's serverless enterprise data warehouse and smart analytics tools allows Refinitiv customers to build and backtest trading strategies, perform quantitative research and analysis, and meet regulatory and best execution requirements.



#### Efficient platform

Because Refinitiv's data can be analyzed in one place, without having to move data or load it into an analytics engine, customers can obtain results more efficiently, allowing data scientists and quantitative analysts to spend more time generating valuable insights.

## Why Google Cloud

Refinitiv needed a massive, secure data repository—supported by HPC capabilities and AI/ML tools—to accommodate the comprehensive data in its Tick History archive and to reduce research and analysis time and cost for its customers. Google Cloud’s grasp of Refinitiv’s market requirements and willingness to innovate within the framework of their managed services offerings made us the preferred partner.



### The results



#### Fast, responsive, remote access

Customers can work on large datasets from anywhere and expect a rapid response.



#### Lower total cost of ownership

Reduced the infrastructure spend and storage required to maintain and integrate the scale of Refinitiv’s Tick History data.



#### Preferred market positioning

This solution sets the table for Refinitiv’s success in an increasingly competitive and automated financial market, where access to large volumes of historical data and near-infinite amounts of compute and storage capabilities are highly valued.



As the cloud delivers on its promise to make AI-based analytics more readily available, the potential of data to deliver answers that drive business performance gets ever greater. Combining Google Cloud’s machine learning tools with Refinitiv’s Tick History data in BigQuery is a step-change for customers looking to develop new trading models, interpret trade patterns, or comply with regulations.”

Catalina Vazquez,  
Proposition Director, Tick History,  
Refinitiv