Google Cloud

Make your database your secret advantage with Google Cloud

Google Cloud offers trusted databases for radically transformative applications

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Executive Summary

This guide provides an introduction to Google Cloud databases tailored for technology decision makers and executives. It provides real-world customer stories that illustrate how leading organizations use Google Cloud database services and details about how you can partner with Google to unlock the power of your data.

In today's connected, digital world, organizations need to find new ways to continuously wow their customers. Running modern applications on legacy, on-premises databases requires overcoming expensive, time-consuming challenges around latency, throughput, availability, and scaling, which makes it hard to invest in innovation. Moving to Google Cloud databases provides the agility you need to transform your business on the platform trusted for innovation. It allows you to deliver great customer experiences while maintaining your freedom to work the way you want. Plus, Google Cloud offers unified services that provide a faster way to build new features and applications and unify your entire data lifecycle.

Through the course of this guide, we'll demonstrate how fully managed Google Cloud databases can help you meet the ever-changing requirements of modern applications and create great customer experiences that will transform your business.

Customer expectations drive transformation across industries

> Today's consumers expect amazing feats of speed and service delivered through easy-to-use apps and personalized interactions.

Modern conveniences, like buy-online and pick-up in store, instant digital payments, and real-time ride sharing requests, have taught consumers that their experience is paramount—no matter how big the company, how complex the problem, or how regulated the industry. At the heart of our always-on, digitally connected world lies a new type of application that provides users with real-time information at a global scale.

Across industries, digital innovators use these new types of applications and data to deliver seamless, personalized experiences. For example, omni-channel experiences in retail have become the new normal for many consumers. Financial services empower consumers to interact with their bank in real time through mobile or online apps. And every day millions of people book and pay for a rideshare through their smartphones, expecting service in a few minutes. Innovation at this scale and speed has triggered massive business transformation—even cultural shifts—further reinforcing the notion to consumers that anything is possible.

It's an exciting time for sure, but it's also a lot of pressure for companies and their development teams, as users' growing expectations continue to up the ante.

Transformation hinges on new cloud database capabilities

A key step to building all-new customer experiences is to select the operational databases that power your applications and, in essence, run your business. Your choice of operational databases can either abstract away the complexity of running a secure, high-performance platform for modern applications and empower your team to innovate, or it can be the bottleneck that degrades the application experience and eats up valuable developer time on tasks like maintenance, performance tuning, and scaling.

When building modern applications for a modern business, keep in mind the following critical tenets of choosing cloud-based operational databases:

Pressing the gas on innovation requires transformative capabilities. New always-on business models require applications to be highly reliable, continuously available, and seamlessly scalable to ensure every user in every region has a positive experience. They require starting with cloud database services that raise the bar on performance, availability, scalability, and security.

> By 2026, enterprises that successfully generate digital innovation will derive over 25% of revenue from digital products, services, and/or experiences.[1]

While data is born in an operational database, that is only the first part of its journey. The most innovative organizations are able to unify the entire data lifecycle by bringing together databases, analytics, and AI/ML in a continuous, connected environment.

> Only 32% of companies reported being able to realize tangible and measurable value from data.[2]

Today's world doesn't stop and wait while you rebuild your database. Moving to the cloud shouldn't derail your developers or send them back to coding class. You want a cloud platform that provides an easy on-ramp for migrating applications from legacy commercial databases, and keeps up with the latest in open source tooling and development languages, so you can migrate from on-premises to cloud without missing a beat.

> 83% of respondents say cloud services that allow their organizations to deliver new capabilities with existing skill sets are important for extracting the full business value of data.[3]

Automation goes a long way to help you build quickly. Keeping your business agile and responsive in today's new world means finding new ways to help developers be creative. You would like solutions that use advanced automation to free them up from hardware and software management tasks, and that seamlessly scale resources to meet demand.

1. IDC FutureScape: Worldwide Future of Digital Innovation 2022 Predictions. Oct 2021 - Doc # US47148621
2. Accenture
3. Turning Data into Unmatched Business Value, Harvard Business Review Analytic Services

Google Cloud databases power today's modern applications

Google Cloud databases provide the foundation for building radically transformative applications by enabling a modern database strategy that is trusted, unified, open, and agile.
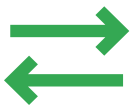
Trusted platform for transformative experiences

Build and innovate with the highest levels of availability, reliability, global scale and security based on decades of our first-hand expertise.

Unified data lifecycle for intelligent applications

Integrate with our large ecosystem of industry-leading data and AI services to break down operational silos.

Freedom to work the way you want

Choose from the most popular commercial and open-source engines to reduce your learning curve, help ease your migration to the cloud and increase the value of your investments.
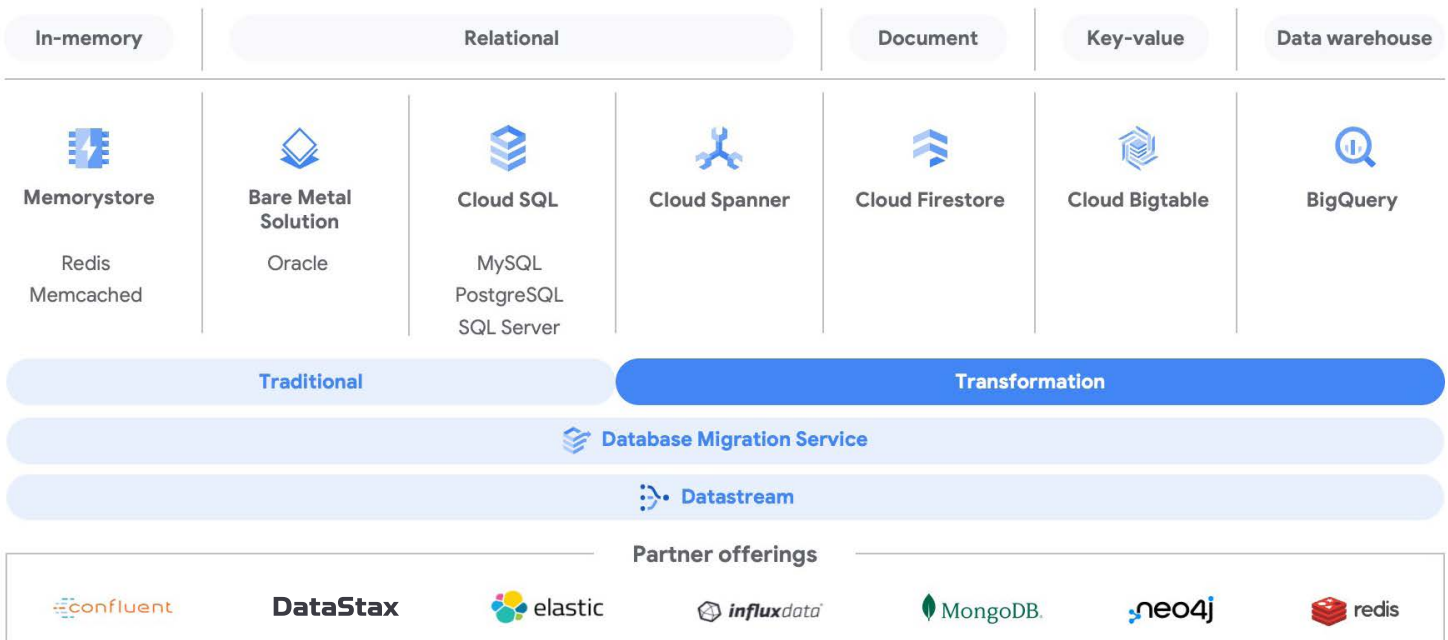
A faster way to create applications

Go from idea to product faster with fully managed database services that include advanced features and capabilities like built-in automation that frees you to work on your applications.

Google Cloud offers database services for any app and use case

In-memory	Relational			Document	Key-value	Data warehouse
Memorystore	**Bare Metal Solution**	**Cloud SQL**	**Cloud Spanner**	**Cloud Firestore**	**Cloud Bigtable**	**BigQuery**
Redis Memcached	Oracle	MySQL PostgreSQL SQL Server				

Traditional	Transformation

Database Migration Service

Datastream

Partner offerings

confluent   **DataStax**   elastic   influxdata   MongoDB.   neo4j   redis

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How well do you know your relations?

Relational databases store information in tables, rows and columns that structure the data. They use relational semantics (i.e. a column in one table can point to data in another table) to ensure data consistency and enable complex queries across multiple tables. Relational databases are used when the structure of the data doesn't change often, such as in banking or supply chain inventory management.

Non-relational databases (or NoSQL databases) store complex, unstructured data in a non-tabular form such as documents and key-value stores. Non-relational databases are often used when large quantities of complex and diverse data need to be organized, or where the structure of the data is regularly evolving to meet new business requirements, such as personalization and web and mobile applications.

Which database should I use?

Memorystore	Bare Metal Solution	Cloud SQL	Cloud Spanner	Firestore	Cloud Bigtable
Fully managed Redis and Memcached for sub-millisecond data access	Lift and shift Oracle workloads to Google Cloud	Managed MySQL, PostgreSQL, SQL Server	Cloud-native with large scale, consistency, 99.999% availability	Cloud Native, serverless, NoSQL document database, backend-as-a-service, global strong consistency, 99.999%SLA	Cloud Native NoSQL wide-column store for large scale, low-latency workloads

Memorystore

Good for:

In-memory and Key-value store

Example use case:

- ↻ Caching
- ↓ Session store
- 🎮 Gaming
- 👆 Personalization
- 📄 Leaderboard
- 📢 Adtech
- 💬 Social chat or new feed

Bare Metal Solution / Cloud SQL / Cloud Spanner

Good for:

EDBMS + scale, HA, HTAP	General purpose SQL DB	EDBMS + scale, HA, HTAP

Example use case:

☰ Legacy applications	▦ Web frameworks	🎮 Gaming
📄 Data center retirement	⚙ ERP	💵 Global financial ledger
	▦ CRM	📋 Supply chain/ inventory management
	🌐 Ecommerce and web	
	☁ SaaS application	

Firestore / Cloud Bigtable

Good for:

Large scale, complex hierarchical data	Heavy read + write, events

Example use case:

📱 Mobile/web/ IoT applications	👆 Personalization
↻ Real-time sync	📢 Adtech
↓ Offline sync	👍 Recommendation engines
👆 Personalized apps	⚠ Fraud detection

GCP operational databases meet 100% of the required criteria specified in Gartner's Solution Criteria for Operational Database Platform as a Service.[4]

Gartner

4. Gartner Solution Scorecard for Google Cloud Platform Operational Databases, July 2021

Trusted platform for radically transformative customer experiences

Google Cloud databases provide a ground-breaking platform for innovation based on decades of our own first-hand experiences with shaping the digital world. We offer industry leading availability, reliability, global scale, and security, enabling you to deliver the best possible experiences for your customers from anywhere in just a few clicks. Our one-of-a-kind databases, like Spanner, Bigtable, and Firestore, provide industry-leading, five 9's SLA (99.999%) to support your always-on applications. Ensure compliance, business continuity, redundancy, and reliability using the same secure-by-design infrastructure, built-in data protection and replication, and multi-layered security that we trust to run our own Google workloads.

With Cloud Spanner, you get the benefits of relational semantics at global scale. Spanner processes over 1 billion requests per second at peak. Cloud Bigtable provides a NoSQL database service built to handle your high-throughput, low-latency applications. Bigtable has more than 10 Exabytes of data under management. Our fully managed, scalable, and serverless document database, Firestore, makes it easy to develop rich web and mobile applications. Firestore has more than 250K monthly active developers.

ShareChat

Customers trust Google Cloud databases to help them create real competitive advantage

ShareChat uses Google Cloud databases to run the leading Indian social media platform with more than 160 million monthly active users sharing and viewing videos, images, GIFs, songs, and much more.

ShareChat migrated from a NoSQL database to relational database Spanner for its global consistency and secondary indexing, which reduced cost by 30 percent. When the company's traffic grew to 500 percent over the span of just a few days, it managed to scale horizontally with zero lines of code change.

→ **Learn more**

Cloud Spanner

Spanner processes over

1 billion

requests per second at peak

Cloud Bigtable

Bigtable has more than

10 Exabytes

of data under management

Firestore

Firestore apps power more than

750M

monthly active end-users using Firebase Auth

Figure: Access ground-breaking technologies that power Google applications, like Search, YouTube, Gmail, and Maps used by billions of users.
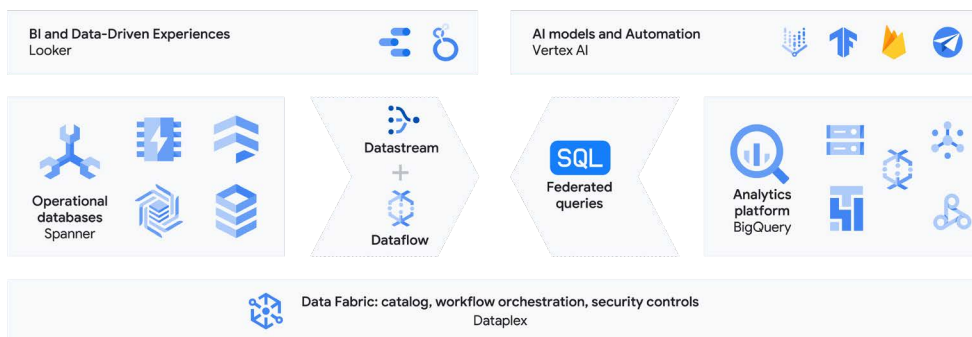
Unified data lifecycle for intelligent applications

Google Cloud databases integrate with the larger ecosystem of market-leading services that make up Google Cloud services, such as: BigQuery, which provides a cloud data warehouse; Google Kubernetes Engine (GKE), a fully managed Kubernetes service; Dataflow for data processing; Datastream, providing change data capture and replication as a serverless service; Pub/Sub for messaging; and Cloud Functions which delivers functions as a service. Together, these services help you break down operational silos, build data pipelines, generate real-time insights, and make better business decisions. Through our native integrations, we make it easy to unify your data lifecycle while ensuring you get the best of Google Cloud at every stage of your development.

Bridge the gap between operational data and analytics by using BigQuery federation to query data residing in Cloud SQL and Cloud Spanner without moving or copying it. Synchronize data across databases, storage systems, and applications to support real-time analytics, database replication, and event-driven architectures with native integrations from Datastream to Dataflow, Cloud SQL, and Spanner.

BigQuery users query over 125 petabytes of data in Cloud SQL on average in a month

Diagram: BI and Data-Driven Experiences (Looker); AI models and Automation (Vertex AI); Operational databases (Spanner); Datastream + Dataflow; SQL Federated queries; Analytics platform (BigQuery); Data Fabric: catalog, workflow orchestration, security controls (Dataplex)

mercari

Customers transform their business using Google Cloud databases to adopt a unified data strategy

Mercari, Inc., Japan's largest C2C marketplace, launched its app in 2013 which allows 18.2 million monthly users to easily and securely buy new and used items. When Mercari started building Merpay, a new mobile payment platform, it needed a database that would support reliable payment processing around the clock. Mercari chose Spanner to achieve up to 99.999% availability with zero downtime for planned maintenance and schema changes.

Because Cloud Spanner integrates easily with other Google Cloud data services, Mercari can easily access its data in Spanner for analytical insights that enhance the business, such as fraud detection. Mercari uses Pub/Sub, Dataflow, and Apache Flink to create batch and streaming data pipelines that pull data from the Spanner databases that run each microservice. The combined data is loaded into BigQuery for analytics. By using Spanner and integrated Google Cloud services, the Merpay platform is flexible, secure, scalable, and highly available.

→ **Learn more**

Freedom to work the way you want

Google Cloud services support MySQL, PostgreSQL, Oracle, SQL Server and Redis, the most popular commercial and open-source engines, which helps you reduce your learning curve, benefit from the latest enhancements and fixes, and ease your migration to the cloud. We also work closely with partners such as MongoDB to offer you a breadth of solutions and help you get the most value from your existing investments. Google Cloud databases support hybrid and multi-cloud deployments, and we help you move your existing workloads and applications to Google through the first-ever serverless Database Migration Service (DMS), designed to make migration easier, faster, more predictable, and more reliable. Use Datastream to synchronize data from Oracle and MySQL databases to BigQuery, Spanner, and Cloud SQL, with minimal latency.

Choose the best path to modernization for your Oracle workloads and applications by migrating to Bare Metal Solution for Oracle, a Google Cloud service that provides reliable, secure, and high-performance database infrastructure for your Oracle workloads. Bare Metal Solution for Oracle offers low-latency integration with with other Google Cloud services like BigQuery and Google Compute Engine. Google also offers El Carro, an open-source Kubernetes operator that automates routine Oracle database administration tasks, so you can migrate and support your Oracle workloads in hybrid and multi-cloud environments.

songkick

Customers have the freedom to work however they want with the fully managed services and open platform enabled by Google Cloud databases

Songkick, the U.K.-based concert discovery service owned by Warner Music Group, adopted Cloud SQL for MySQL for all four of its databases which handle approximately 1.25 TB of data.

By moving to Google, Songkick no longer has to deal with database infrastructure management issues like hardware failure, and software upgrades. This saves the company over a month of testing and prep work that was previously required for its physical servers.

→ **Learn more**

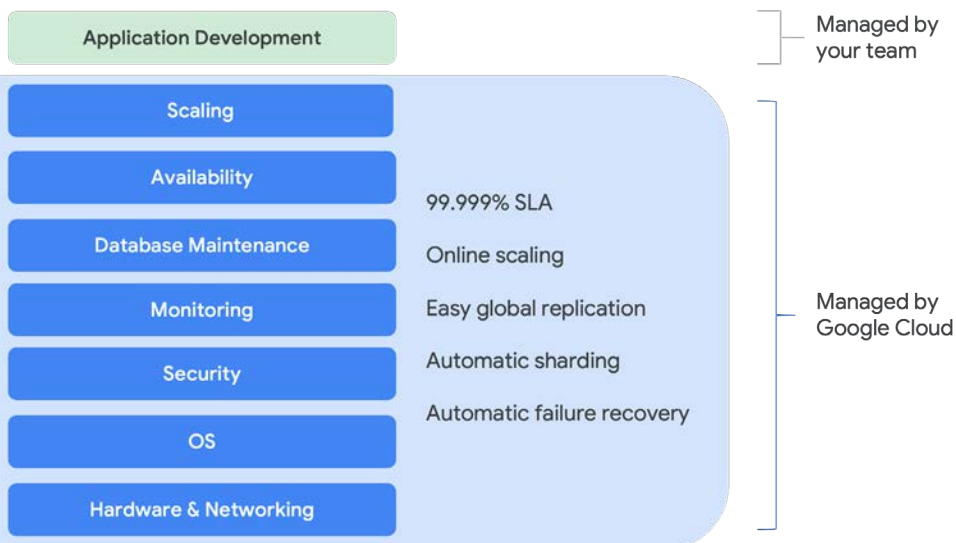| Database			Google Cloud Service
Oracle	ORACLE	→	Bare Metal Solution
SQL Server	Microsoft SQL Server		Cloud SQL for SQL Server
PostgreSQL			Cloud SQL for PostgreSQL
MySQL	MySQL		Cloud SQL for MySQL
Redis	redis	→	Memorystore for Redis	Redis Enterprise Cloud
Memcached		→	Memorystore for Memcached
HBase	HBASE	→	Bigtable
MongoDB	MongoDB	→	MongoDB Atlas

Figure: Managed services for quickly and safely migrating your databases

A faster way to create applications

Google Cloud databases help you go from idea to product faster by offering advanced features and capabilities as part of a fully managed service. Empower your developers to iterate and deploy quickly through our intuitive UI and automated provisioning and management.

Our managed database services, like Cloud SQL, make it easy for developers to automate the process of creating, modifying, cloning, and duplicating database servers. We complement your existing application performance monitoring (APM) and observability tools by providing database metrics and traces through the OpenTelemetry open standard.

AutoTrader

Customers use Google Cloud databases to help them quickly transform their entire business

Auto Trader wanted to improve the process of buying and selling vehicles in the UK by creating a platform for consumers to connect with retailers and manufacturers. As Auto Trader grew, it needed to move faster.

Historically, the company ran a massive on-premises Oracle database. Moving to Cloud SQL helped Auto Trader create a seamless development experience.

Since modernizing to Google Kubernetes Engine (GKE), Istio, and Cloud SQL, Auto Trader's release cadence has improved by over 140 percent (year over year), enabling 458 releases to production in a single day. Auto Trader's fast-paced delivery platform managed over 36,000 releases in a year.

→ **Learn more**

Accelerate your transformation journey with Google Cloud

Whether you want to increase your agility and pace of innovation, better manage your costs, or entirely shut down data centers, we can help you accelerate your move to the cloud by following a three-phase journey: migration, modernization, and transformation. Of course every organization's journey will look very different, but this is one way you can think about your move to the cloud.

If you need to move many applications and databases to the cloud quickly, we offer a fast-track approach to lift and shift what you're running today to managed database services. Once migrated, you can modernize your database environment by transitioning off your legacy databases onto open source or cloud-native solutions. Finally, you can choose to build next-gen applications entirely in the cloud, and our cloud-native databases are designed to accelerate your transformation.

Wherever you are in your journey, we're ready to support you with the services, best practices, and tooling ecosystem you need for success. Try our Database Migration Service (DMS), a serverless offering for confidently migrating to Cloud SQL, and/or Datastream, a serverless change data capture (CDC) and replication service that helps you synchronize data across heterogeneous databases for database replication.

Delight your users and deliver modern experiences by using Google Cloud databases to help you migrate, modernize, and transform for the future.

> More than 85% of the migrations using Database Migration Service are underway in less than an hour.

Start your migration with a database assessment

Moving your organization's data to the cloud is a big decision. You deserve to know what you're in for before you commit. Google Cloud can help you develop a customized plan that takes the guesswork out of migration.

Ready to make a cloud migration plan?

Request assessment

Looking to connect with an expert first?

Get in touch

ADDITIONAL RESOURCES

→ Migrating your databases to managed services

→ Cloud databases: the secret advantage of digital innovators

→ Business transformation with cloud databases