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Modernizing Mainframes with
Rocket Enterprise Server and Google Cloud

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Why Modernize and how can Google Cloud Help?

Mainframes store valuable business data and support critical functions for many organizations. Modernizing these systems can unlock significant business value by leveraging modern cloud technologies to improve agility and scalability while reducing costs. Mainframe application modernization drives innovation, optimizes infrastructure, lowers costs, and reduces technical debt. **By combining Rocket Software solutions with Google Cloud technologies,** organizations can replatform mainframe applications to Google Cloud with minimal changes, substantially reduce mainframe costs and accelerate their mainframe modernization strategy to achieve efficiency in application modernization.
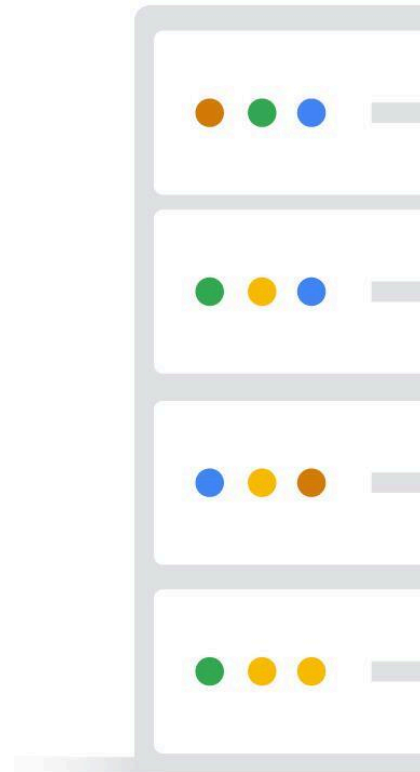
Although many organizations recognize the need to modernize, they still rely on core IT systems to run essential business services and applications. IT leaders understand the challenge of unraveling decades-old complexity and technical debt to unlock this value.

Based on business and functional requirements, organizations can accelerate their digital transformation journeys by reusing and enhancing existing mainframe applications and data—without necessarily replacing them.

The Mainframe: Underpinning Digital Transformation and the Path to the Cloud

Application modernization is crucial for achieving the agility and innovation necessary to remain competitive and lead. Organizations can accelerate application delivery, optimize infrastructure, and reduce costs by updating core mainframe processes with modern tools and technologies.

We often see three key drivers of digital transformation that help customers choose a pragmatic, cost-efficient, and risk-reducing mainframe-to-cloud transformation model.

Application and data

Modernizing applications empowers organizations to innovate and scale, supporting new business channels and functions. This typically involves enhancing core mainframe processes and secure transactions with modern development tools, containerization, API models, managed code, and service-based architectures. These upgrades enable organizations to add new capabilities, streamline business integration, and improve end-user experiences in core mainframe applications.

The process

Application delivery is driven by evolving business needs in a world that is getting more competitive each day. Mainframe teams working with TSO/ISPF and waterfall methods take longer to add new application capabilities than agile, cloud-based approaches. However, through modernization and adopting industry standard tools and DevOps practices, mainframe teams can now achieve the speed needed to support today's digital business requirements.

The infrastructure

As users now access applications from anywhere and across multiple devices, organizations seek flexible deployment options to deliver their applications as cloud services. Mainframe shops now use a variety of platforms, like Windows® and Linux®, and more workloads are moving to public, private, and hybrid cloud infrastructures. Mainframe applications deployed to Google Cloud can support an always-on, available-everywhere digital ecosystem to deliver your flexible business services.

Mainframe Applications

COBOL and PL/I have always been the leading languages for developing custom business applications on the mainframe, and they remain essential for global enterprises. According to the 2024 Vanson Bourne survey, 80% of customers classified their mainframe applications as strategic to their organization.

Modernization choices

CIOs of organizations looking to develop a cloud strategy should consider several modernization patterns for their mainframe applications.

Option	Description	Pros	Cons
Rewrite (Now accelerated using Google Gemini and generative AI)	Reimagine and recreate the current mainframe application functionality in a target architecture and languages that are native to the cloud.	Increases agility, reduces cost and technical debt, addresses concern about programming language skills.	Most significant investment needed and can take the longest.
Refactor	Use automated rule-based transformation tools to convert source mainframe code "as-is" to modern languages, such as Java®.	Reduces cost, allows access to modern cloud infrastructure, allows access to a larger developer talent pool.	Output code will not be as easy to maintain and innovate and with the performance potential of an application that is recreated from the ground up.
Replatform	Replatform the applications 'as is' to a platform supporting cloud deployment.	Faster modernization path with considerable cost savings compared to mainframe. Provides a platform for further application modernization. Enhanced developer productivity by giving developers access to modern development tools.	Keeps the original codebase's technical debt.

Augment	Retain the application on the mainframe, but replicate/copy application data to the cloud in near real time or periodically.	Unlocks the full potential in mainframe data by providing an option to leverage cloud technologies on top of mainframe data and establish a cloud EDW.	Does not reduce mainframe cost and technical debt.
Replace	Implement a Software as a Service (SaaS) packaged solution to replace current systems with readily available alternatives.	Alleviates the need to rewrite, replatform or refactor mainframe applications.	Not suitable for highly customized or integrated mainframe applications, cost can sometimes be an issue.

Customers will often combine multiple modernization patterns for different mainframe applications. For example, customers can choose to combine elements of Replace, Augment, and Replatform to create a platform that delivers the tools and processes required to support application modernization for both short- and long-term strategy. This approach will simultaneously enable deployment to either the mainframe or an alternative platform based on business and operational requirements.

Key Benefits

When focusing on the replatforming pattern for mainframe workloads, organizations achieve flexibility and avoid unnecessary reinvestment by reusing trusted, core mainframe applications on distributed cloud platforms. Specific business gains include:

- Meet the regulatory compliance demand to keep customer data within a country.
- Use Google Cloud's reliable, secure, scalable, and resilient infrastructure to reduce annual operating costs (often by up to 90% as compared to the mainframe).

- Contain and manage z/OS® MIPS usage targets by redistributing suitable application workloads to Google Cloud.
- Increase integration by delivering an open and extensive API layer on top mainframe applications running on Google Cloud.
- Accelerate new systems delivery in new geographies by replicating trusted systems.
- Enhance developer productivity by an estimated 30%-40% by leveraging modern development environments for your mainframe applications.
- Delay or avoid upgrades required to add processing capacity and reduce MLC.
- Duplicate discrete functions, like pricing quotes, to better service new market requirements.
- Provide continuous service during scheduled mainframe downtime.
- Bring disaster recovery implementations in-house instead of using a costly outsourcing service.
- Maintain Quality of Service (QoS) levels at reduced cost in the cloud.

Why Google Cloud?

Google Cloud is the new way to cloud, empowering organizations to go from concept to impact—today. By fusing cutting-edge AI with powerful infrastructure, developer tools, data, security, and collaboration solutions, we help businesses solve problems creatively and reimagine what's possible.

Backed by a decade of Google's AI research and development, and fueled by the expertise of Google DeepMind, Google Cloud is uniquely positioned to help organizations worldwide build transformative gen AI experiences across critical areas of business.

Google Cloud also offers both Google-made and partner-made mainframe modernization products and solutions for most in-demand modernization patterns.

We're at a pivotal moment where businesses recognize AI as essential for transformation. Google Cloud has infused AI across five key product lines that our customers love and rely on daily. These include:

- A Modern Infrastructure Cloud to help businesses and governments build quickly, securely, and cost-effectively with the next generation of infrastructure designed to meet specific workloads and industry needs. Our infrastructure is

optimized for AI, container-based applications, enterprise workloads, and distributed workloads. It offers high reliability, cost efficiency, and performance and is designed for sovereignty, scalability, and control.

- A Developer Cloud to help accelerate application development with a streamlined developer experience, AI-powered tools, robust container management, and easy generative AI integration. Setting up and coding is simpler with Google Cloud's intuitive console, quickstart templates, and code agent. Deployments are faster using industry-leading Kubernetes scaling and serverless capabilities. Lastly, Vertex AI offers a comprehensive platform for developers to quickly and easily integrate generative AI into projects, including advanced models like Gemini and user-friendly tools like Vertex AI Agent Builder.

- A Data Cloud to help organizations connect all of their data with groundbreaking AI to unleash transformative insights, enabling customers to be as powerful and adaptable as the technology itself. Google offers a robust data platform that handles diverse workloads and storage environments, scales effortlessly and protects sensitive information—all while, accelerating innovation and enabling customers to unlock their full data potential.

- A Security Cloud, so organizations can make Google part of their security team with Mandiant frontline experts, intel-driven security operations, and a secure cloud platform—supercharged by AI. Already, Gemini in Google Security Operations reduces the time analysts spend on writing, running, refining security searches, and triaging complex cases by 7X.

Organizations also benefit from operating their business on the same planet-scale infrastructure that powers many of Google's products used by billions—YouTube, Android Workspace, Chrome, Maps, and of course, Search. As of August 2024, our global footprint includes 40 regions, 121 zones, and 187 edge locations, with service available in over 200 countries and territories, all connected by an extensive system of fiber-optic cables. We built this infrastructure for ourselves to deliver performance, reliability, scalability, and cost efficiency—advantages that extend to our customers as well.

We continue to see tremendous momentum across our technology portfolio and the millions of customers who work with Google Cloud. These successes—from our millions of customers and expanding Partner ecosystem to our industry leadership and rapid pace of innovation—all contribute to why Google Cloud is the fastest-growing cloud provider.

Why Rocket Software?

Rocket Software is the market leader in mainframe solutions. The Rocket® Enterprise Portfolio (formerly Micro Focus) provides all the tools necessary to analyze, replatform, support, and modernize mainframe applications. This solution set includes Rocket® Enterprise Analyzer*, Rocket® Enterprise Developer*, Rocket® Enterprise Test Server*, and Rocket® Enterprise Server technologies*.

Our solution set enables:

- The capability to replatform mainframe applications with minimum change to Linux, Windows, or UNIX®, either on-premises or in the cloud.
- The ability to transition IBM Db2®, IMS DB, QSAM, and VSAM data into alternative database and file systems on Linux, Windows, or UNIX.
- Support for online CICS® and IMS™ applications.
- A batch environment to support the move of current jobs, job control, and batch utilities.

We provide our customers with:

- The opportunity to expand into new territories without mainframe data centers.
- Greater flexibility in mainframe utilization by freeing up headroom for other application workloads.
- Time-to-market reduction of up to 40% through development productivity improvements.
- Increased customer satisfaction via improved system performance and quality.
- Operating cost reductions of up to 90% per year.

How can mainframe modernization benefit your organization?

- Proven experience: We've delivered 1,000+ platform modernization projects in recent years.

- Keep what works: Run core COBOL and PL/I applications in a native or managed code environment across all major supported platforms.
- Comprehensive support: Compatible with all core applications and major data stores. Easily transition your database variants to the cloud or virtual environments.
- Stay current: Certified for virtualized and cloud environments, including Google Cloud and Docker containers.
- Accelerate innovation: Bring your new functionality to customers seven times faster.
- Reduce and improve: Customers can expect a 50%–90% reduction in IT operations costs and a performance improvement of up to 50% for batch and online transactions.

Mainframe source	Rocket target
z/OS, z/VSE®	Windows, Linux
CICS, IMS TM	Rocket® Enterprise Server Online Support
Batch JCL (JES2, JES3, POWER)	Rocket® Enterprise Server Batch Support
COBOL	Rocket® COBOL
PL/I	Rocket® Open PL/I
REXX	Rocket® Enterprise Server REXX Support
VSAM	Rocket® Enterprise Server VSAM Support
IMS	Rocket® Enterprise Server IMS Support
Db2	SQL Server, Db2 LUW, Oracle®, PostgreSQL

Table 1. How Rocket Software can enable current mainframe services to be mapped to Google Cloud, while retaining the core services needed to enable the applications to run unchanged.
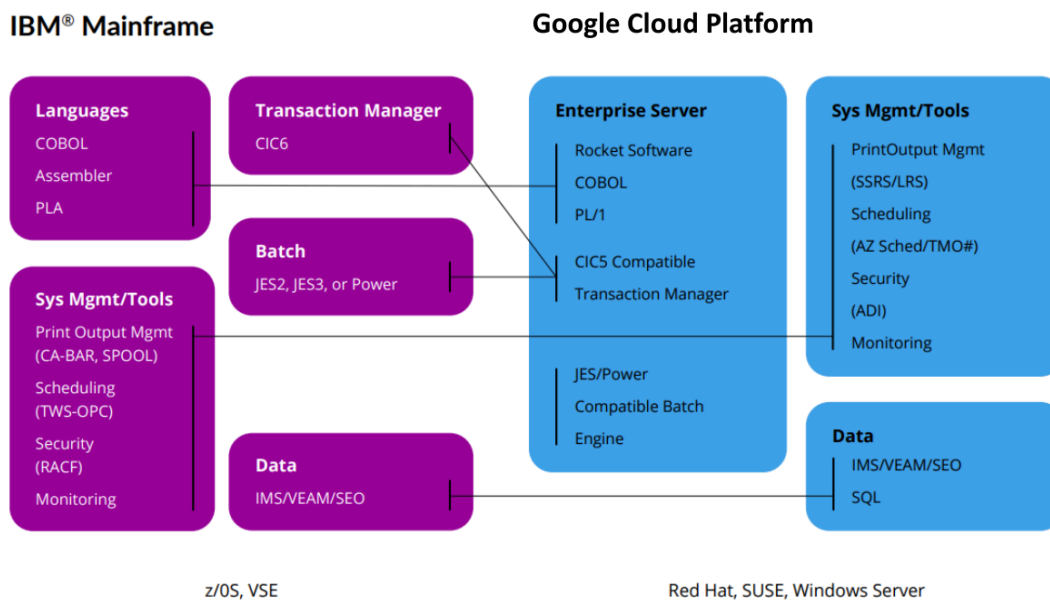
Figure 2. How a mainframe application developed in COBOL or PL/I and dependent on online and batch services can be mapped into a Google Cloud environment using Rocket Enterprise Server.

Organizations using Rocket® Enterprise solutions retain their application's business logic, user interfaces, and data access controls. Many customers have successfully deployed mainframe applications to Google Cloud using Rocket Enterprise Server.

For example, a large European bank that supports corporate and institutional customers replatformed a large estate of applications, including over 45,000 COBOL programs, 6,300 CICS transactions, 25,000 JCL batch processes, 8,000 datasets application files, and 10,500 DB2 tables, to **Rocket Enterprise Solution hosted on Google Cloud.** It's a highly regulated industry and requires significant testing and certification effort, and Google Dual Run solution de-risked and accelerated the overall migration.

IT and Business Benefits of Enterprise Server in Google Cloud

Business-critical applications running on the mainframe typically handle large volumes of transactions securely and reliably with a Service Level Objective (SLO) of 99.99% or higher. To meet these service demands, businesses require:

High availability with redundancy and built-in parallel operations.

- Scalable capacity based on business needs.
- Highly secure operations with data encryption at rest and in transit, centralized authentication and authorization, audit trails, key management, and policy compliance.
- System management and administration that provides centralized monitoring, alerting, logging, metering, patching, backup, and automation.

The fastest, lowest-risk way to move your business-critical mainframe applications to the cloud is by leveraging your current application investments and their unique business value. To do this successfully, you need an application production environment and infrastructure to maintain the high QoS your business requires. Rocket Enterprise Server on Google Cloud delivers this solution.

Rocket's Enterprise Server offers a scalable production engine tailored to suit even the largest mainframe workloads, ensuring top-tier security, reliability, availability, and serviceability. Migrate your existing mainframe COBOL and PL/I applications to Google Cloud with minimal modifications. We also provide support for online CICS and IMS transactions, along with a batch environment to facilitate the modernization of your current jobs, job control, and batch utilities. DB2, IMS-DB, QSAM, and VSAM data can be transitioned into alternative database and file systems, allowing for replatforming to diverse Linux distributions, Windows, and UNIX.
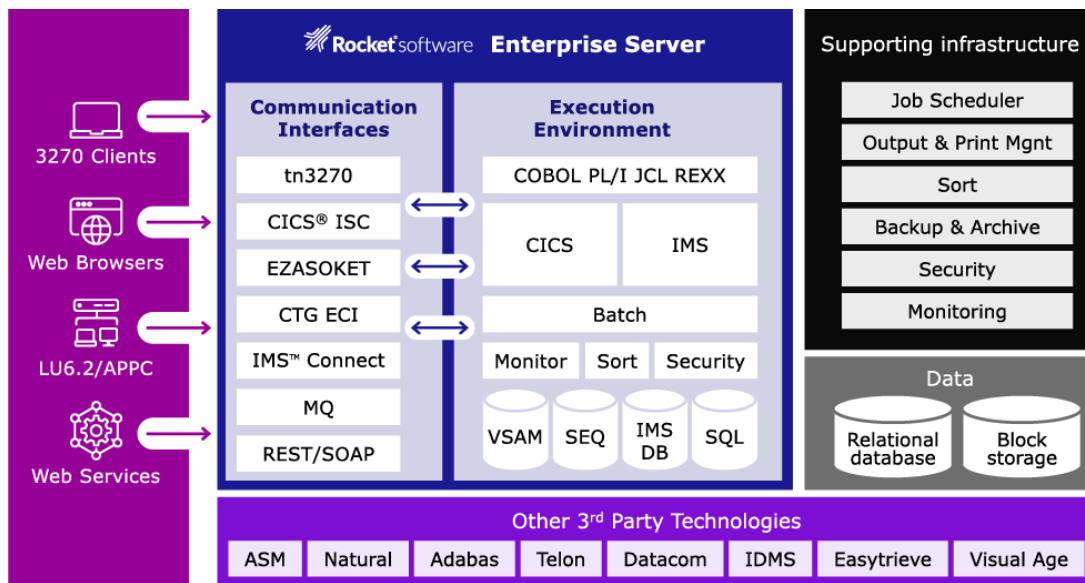
A foundational, highly available environment can be deployed automatically with an Enterprise Server on a Google Compute Engine (GCE). Application data (relational and indexed) is stored in a relational database such as Cloud SQL. Besides infrastructure-as-a-service (IaaS) deployment using Google Compute Engine instances, Enterprise Server can also be deployed in Docker containers and orchestrated using Kubernetes with Google Kubernetes Engine (GKE).

Additional third-party utilities for batch scheduling, output, and print management can be deployed onto extra Google Compute Engine instances and integrated with the Enterprise Server environment.
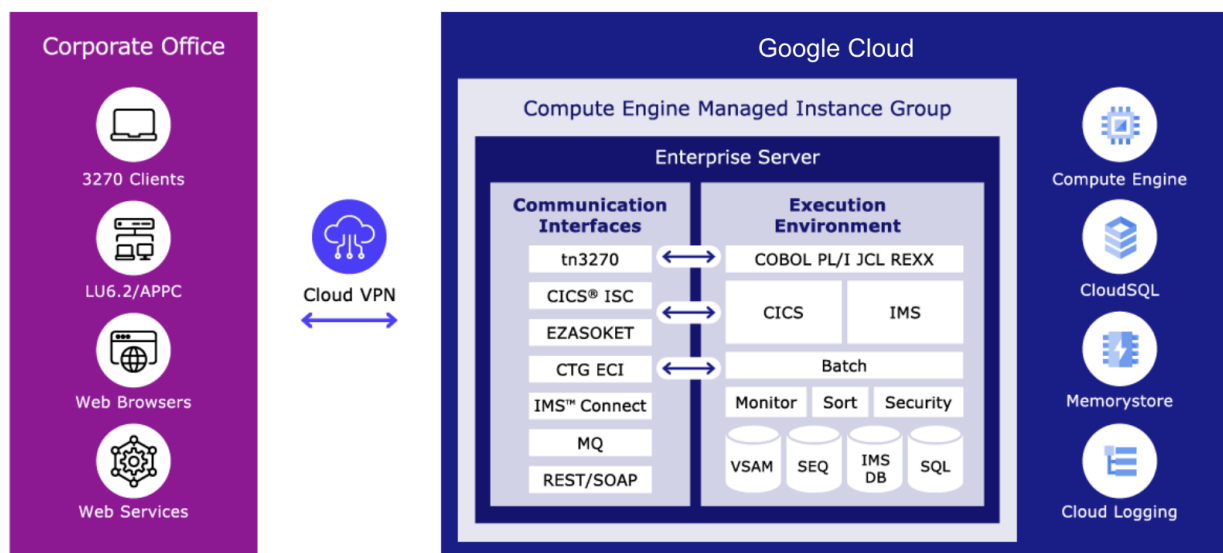
Enterprise Server on Google Cloud Architecture Overview

Mainframe workloads can have stringent, non-functional requirements, especially around performance with massive throughput and I/O. To meet these needs, a fit-for-purpose approach is necessary, enabling you to identify the most appropriate compute, storage, IOPS, and networking services on Google Cloud.

Google Cloud offers a wide range of Google Compute Engine machine types and networking options to support scale-up (vertical) and scale-out (horizontal) scalability. This includes cloud services like Google Kubernetes Engine and Cloud Run, which enable flexible, dynamic scaling.

With Google Cloud, customers aren't limited by the capacity of a single machine (avoiding scalability bottlenecks) or constrained to vertical scaling and peak capacity sizing (which can lead to unused resources). Instead, they have virtually unlimited access to Google Cloud resources that automatically scale horizontally to handle peak loads whenever they occur.

Enterprise Server can leverage these Google Cloud resources and provide application scale-out capabilities through its Performance and Availability Cluster (PAC). This allows multiple distinct execution environments to run workloads in parallel that can be synchronized and managed as a single instance. As a result, COBOL and PL/I applications can run in Active-Active configurations across different zones. With data,

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including mainframe data files, deployed to relational data stores, data can be shared and replicated across multiple zones. These zones are connected through low-latency links to meet the availability requirements and SLOs.

Enterprise Server blueprint deployment architecture in Google Cloud
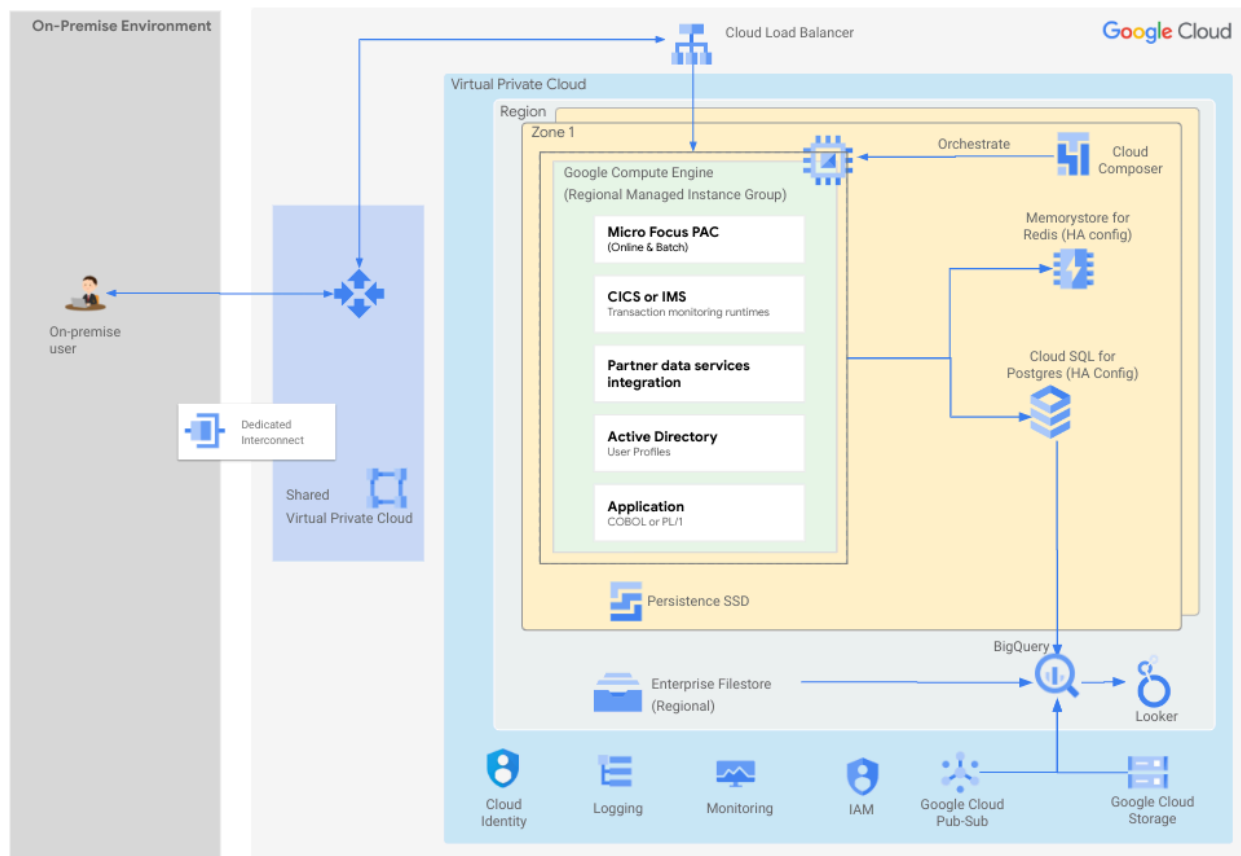
Scalability is essential for dynamically adjusting the infrastructure and application capacity to meet flexible, changing workload needs. This is especially important today, as demand fluctuates drastically, and customers prefer to pay only for what they use.

The Enterprise Server PAC is designed for elasticity and horizontal scaling. Combined with Cloud Load Balancing and Managed Instance Groups, Enterprise Server instances in Google Cloud can be added or removed dynamically from a cluster (that can operate across multiple zones) based on customizable thresholds like CPU utilization. This on-demand scaling means you only pay for the resources you use.

Security is also a key concern. Customers moving to Google Cloud want to inherit best practices in policies, architecture, and operational processes to meet their security requirements.

Enterprise Server also has a robust security model, offering the high levels of authentication and resource access control that mainframe customers expect. This ensures that secure access to business applications and their data can be comprehensively managed. Enterprise Server can also leverage Google Cloud Identity and Access Management (IAM) to centralize access control across all Google Cloud services and regions with detailed auditing via Cloud Logging and notifications with Cloud Monitoring.

For data confidentiality, integrity, and compliance, the Enterprise Server on Google Cloud provides extensive encryption of data options in transit without application changes. Standard capabilities include the encryption of data in transit when using web-based services to interact with the customer using TLS 1.3. By supporting the latest TLS standard in the Enterprise Server, customers' data is fully protected and prevents private data from being visible when it is transferred within the cloud.

Once an application has been deployed to the cloud, it needs to be operated and managed. To do this, Enterprise Server provides system management features and services that can be integrated into an enterprise operations framework.

For administration purposes, Enterprise Server instances and PACs, when deployed onto Google Cloud instances, are configured and managed using a single web console, Enterprise Server Common Web Administration (ESCWA). This also provides secure, extensible support for RESTful APIs that can be used to integrate with or automate the configuration and management.

For centralized logging and monitoring, Google operations Suite's Cloud Logging provides real-time log management and analysis. Cloud Logging ingests VM, Enterprise Server, and Google Cloud

 services log data to support performance, troubleshooting, security, and business insights using Log Analytics.

Operation Suites Cloud Monitoring provides visibility into the performance, uptime, and application health. It collects metrics, events, and metadata from Google Cloud services, hosted uptime probes, and application instrumentation, visualizes this data on charts and dashboards, and creates alerts to notify you when metrics are outside of expected ranges.

For centralized backup, Google Cloud supports taking snapshots of both Enterprise Server Persistent Disks and the managed database. Backup snapshots are saved in Cloud Storage, a reliable and secure object storage.

For data and analytics, Google Cloud provides BigQuery, a fully managed and AI-ready data analytics platform that helps maximize the value from myriad data sources such as Google Cloud Storage, Files in Enterprise Filestore, Cloud SQL for Postgres, and others and generate business insights using Looker.

For additional system management needs, you can explore the many out-of-the-box Google Cloud management services. These allow comprehensive management and deployments of Enterprise Server on Google Cloud virtual machine instances in all regions, with automation and readily available resources.

Deploying your applications to Enterprise Server on Google Cloud delivers the quality of service demanded by large-scale critical mainframe workloads. It provides the high security, availability, elasticity, operational excellence, and cost optimization you require. Combined with Application Analysis tools and modern development environments as part of a DevOps CI/CD pipeline, you can develop, test, and modernize applications faster and deliver innovation to the business sooner.

Achieving Efficiency in Application Modernization

Leveraging Rocket® Mainframe replatforming solutions running in Google Cloud provides a mainframe application development and deployment environment that supports industry-standard operating systems. This enables customers to deploy business-critical mainframe applications to Google Cloud with minimal to no change**,** offering **greater flexibility, faster deployment, and lower project costs, all while retaining the application's business functions.** Rocket® Software solutions support the modernization of core mainframe COBOL and PL/I applications through its class-leading Rocket* Enterprise Analyzer, Rocket* Enterprise Developer, and Rocket* Enterprise Server.

*Formerly Micro Focus products

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Next Steps

Of course, no two mainframe organizations are quite the same. To find out how a combination of Rocket Software solutions and Google Cloud technologies can be used as an accelerator and differentiator for your mainframe modernization strategy, **contact us for a no-cost consultation - mainframe@google.com.**

About Rocket Software

Rocket Software is the global technology leader in modernization and partner of choice that empowers the world's leading businesses on their modernization journeys, spanning core systems to the cloud. Trusted by over 12,500 customers and 750 partners, and with more than 3,000 global employees, Rocket Software enables customers to maximize their data, applications, and infrastructure to deliver critical services that power our modern world. Rocket Software is a privately held U.S. corporation headquartered in the Boston area with centers of excellence strategically located around the world. Rocket Software is a portfolio company of Bain Capital Private Equity.

About Google Cloud

Only Google Cloud brings together innovations from across Google to help organizations create a new way forward in the AI era.

Google is a leader in AI and has been at the forefront of AI innovation for over a decade, uniquely positioning Google Cloud to take advantage of groundbreaking innovations and in-house research. We bring this innovation together in a unified AI platform to help organizations build, use, and succeed in adopting generative AI.

On top of this, we accelerate every organization's ability to digitally transform with leading-edge solutions for infrastructure, application development, data, security, and collaboration. Organizations can operate their businesses using the same reliable, cost-efficient, planet-scale infrastructure that powers many of Google's globally used

products. Our unwavering commitment to innovation and helping our customers succeed is why nearly 60% of the world's 1,000 largest companies and nearly 90% of generative AI unicorns are customers of Google Cloud.