



G4 - Automated Code Conversion Tool

White Paper / FAQs

Date: April 17th, 2023

Authors: Rajesh Ramachandran, Cat Perry

The intention of this document is to provide a high-level overview of one of Google's Mainframe Modernization solutions, G4, Google's automated code conversion tool. This document is intended to answer frequently asked questions around our refactoring solution, what the solution entails, and how we engage with customers to deliver this solution to meet their objectives.

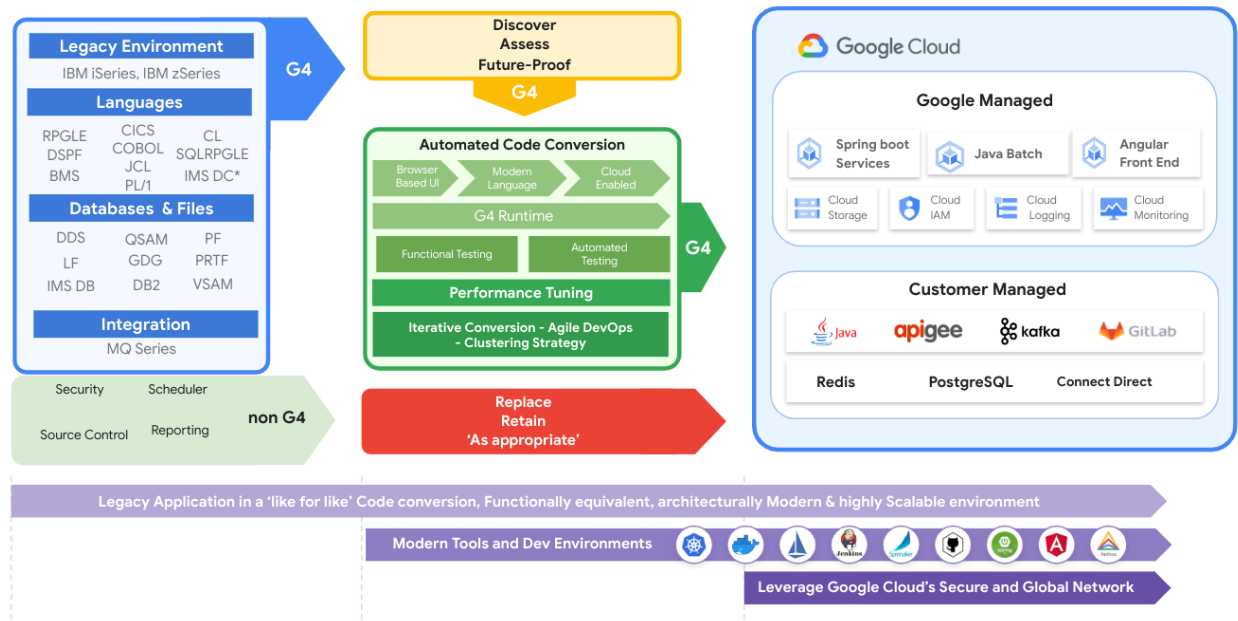
Table of Contents

What is G4?	1
What are the benefits?	2
Industry leading technology from Google	2
What challenges does this solve?	3
Google's approach	3
What infrastructure changes are required?	4
What infrastructure is recommended?	4
G4 Support Stack for z/OS	5
G4 key features for iSeries	6
Recommended architecture	7



What is G4?

G4 is Google’s modernization solution for customers looking to refactor their Mainframe or Midrange applications. Developed by Cornerstone Technology and acquired in 2020, G4 automates the code conversion process by providing tools to transform legacy program languages like COBOL, PL/1 or RPG into modern Java.



**IMS DC currently in development*

The G4 Platform is both programming **language- and platform-independent** and can handle the **most common legacy languages**. Customers taking advantage of this approach to legacy modernization have seen **significant business agility** improvements and **cost savings**.

We recognize the fact that our customers all have a unique combination of languages, database systems, transaction monitors, and schedulers. The G4-based solution takes into consideration all of these different unique characteristics.



What are the benefits?

Converting your legacy application to run on a cloud-native environment **eliminates all dependencies on legacy technologies and skills**. This is contrary to the re-host approach that eliminates the mainframe hardware dependency but is still 100% reliant upon mainframe software and skills.

G4 allows for more innovation in the following areas:

- Cloud-ready solutions that can be run and be managed in containerized environments
- Access to a larger pool of Java developers and modern tooling
- Access to leverage Google Cloud's reliability, scalability, and elasticity
- Ability to granularly maintain, deploy, and scale services
- Large run cost savings compared to Mainframe
- The agility customers need to create a new product or neutralize a competitive threat in the market
- An accelerated approach to unlocking mainframe data compared to a rewrite

What challenges does this solve?

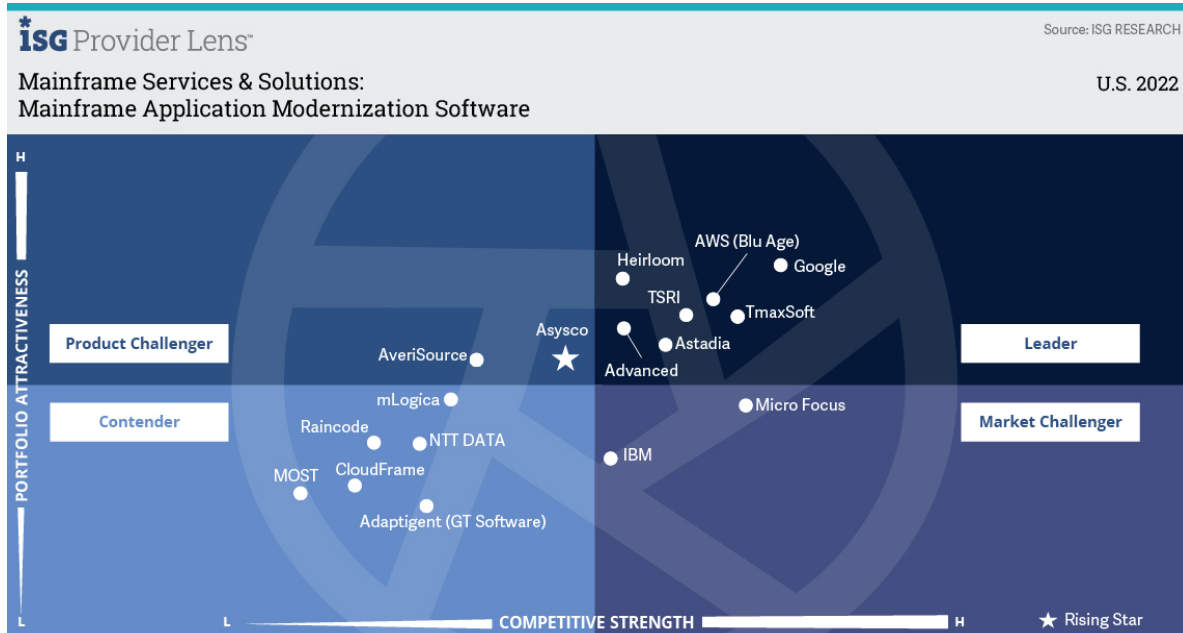
G4 is targeted to solve for the following challenges customers face today:

- Lack of mainframe skills in the customer's organization and in the market
- Lack of SMEs available within the customer's organization
- Inability to meet market demands in terms of business agility and time to market
- Cloud readiness and transitioning to a modern language, tooling, and skillset
- No funding to spend on a rewrite
- High cost of running on Mainframe
- Wanting to leverage services available in Google Cloud



Industry leading technology from Google

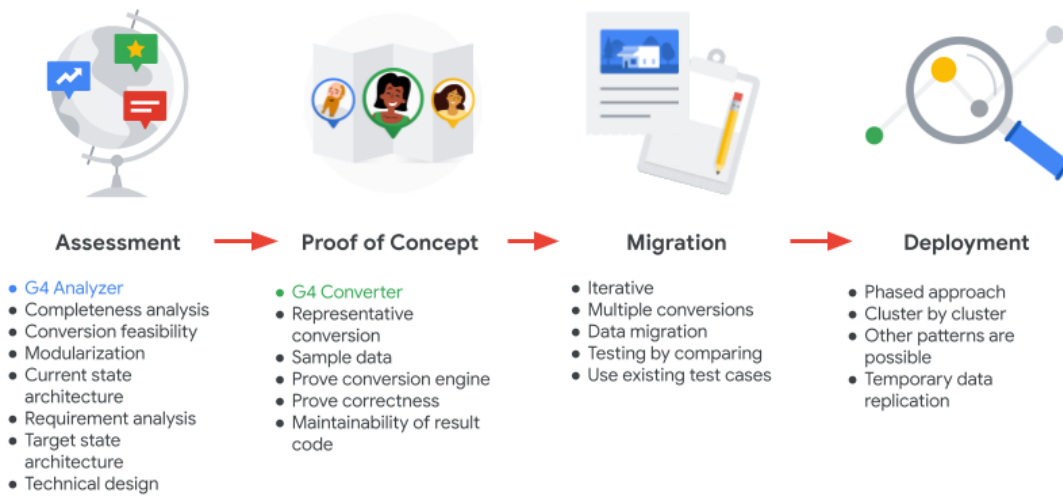
ISG, a leading analyst in the industry, named Google's G4 as a leader in Mainframe modernization technology in 2021 and 2022.



Google’s approach

As the first step in a modernization journey, Google recommends starting with an assessment where we will conduct a deep-dive analysis of the application environment—including the applications, their dependencies, the languages, and associated databases. With that knowledge, we can then derive the recommended modernization solution. The important thing to keep in mind is that there is certainly no one-size-fits-all solution for every environment.

The information gathered during the engagement will provide a blueprint for the journey from legacy to Google Cloud, and provide any supporting financial and business cases for project approval. The assessment engagement requires access to customer-owned source code to analyze the interdependencies and understand technical debt. After completing the assessment, customers can get a proof of concept (POC) to prove the capabilities. Detailed below is a typical engagement process we follow for a G4 approach with customers.



Google Cloud

What infrastructure changes are required?

G4 doesn't require any infrastructure changes on the mainframe. If the end solution requires connectivity back to the mainframe, then it requires TCP/IP connectivity to the mainframe from Google Cloud. Cloud connectivity options should be evaluated and selected based on customer requirements.

What infrastructure is recommended?

To run the converted applications on Google Cloud, we recommended Google Kubernetes Engine (GKE), GCS, and Filestore. Since the converted application is containerized, depending on the application requirements, you can execute the app in a serverless infrastructure such as Cloud Run.

Recommended architecture for production <i>*could change based off of customers requirements/choices</i>	
GKE Regional Cluster	Hosts highly available modernized application after conversion
Filestore Enterprise	Shares files between batch jobs running on GKE



Google Cloud Storage	Archives data, such as files and backups
Apigee or API Gateway	Consumes/exposes services
Cloud SQL / Spanner / AlloyDB	Database of choice
Recommended architecture for POC	
VMs (w/ persistent disk)	Runs docker images and stores output/input files
PostgreSQL	Data purposes

G4 Support Stack for z/OS

The following diagram details individual legacy technology components and the recommended corresponding mapping of the target state technology.

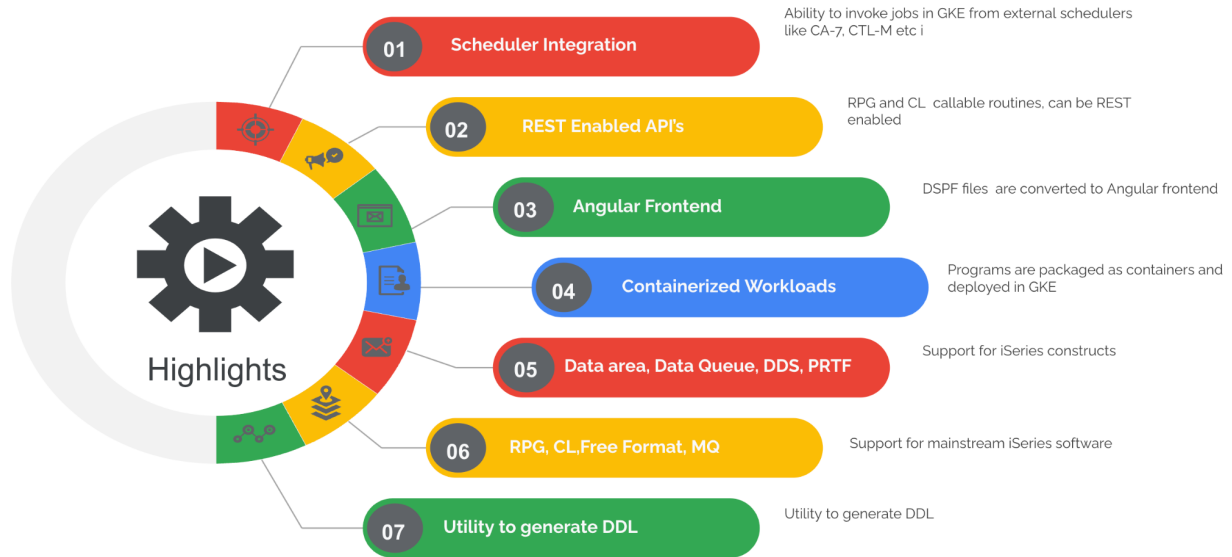
G4 key features for Mainframe





**IMS DC currently in development*

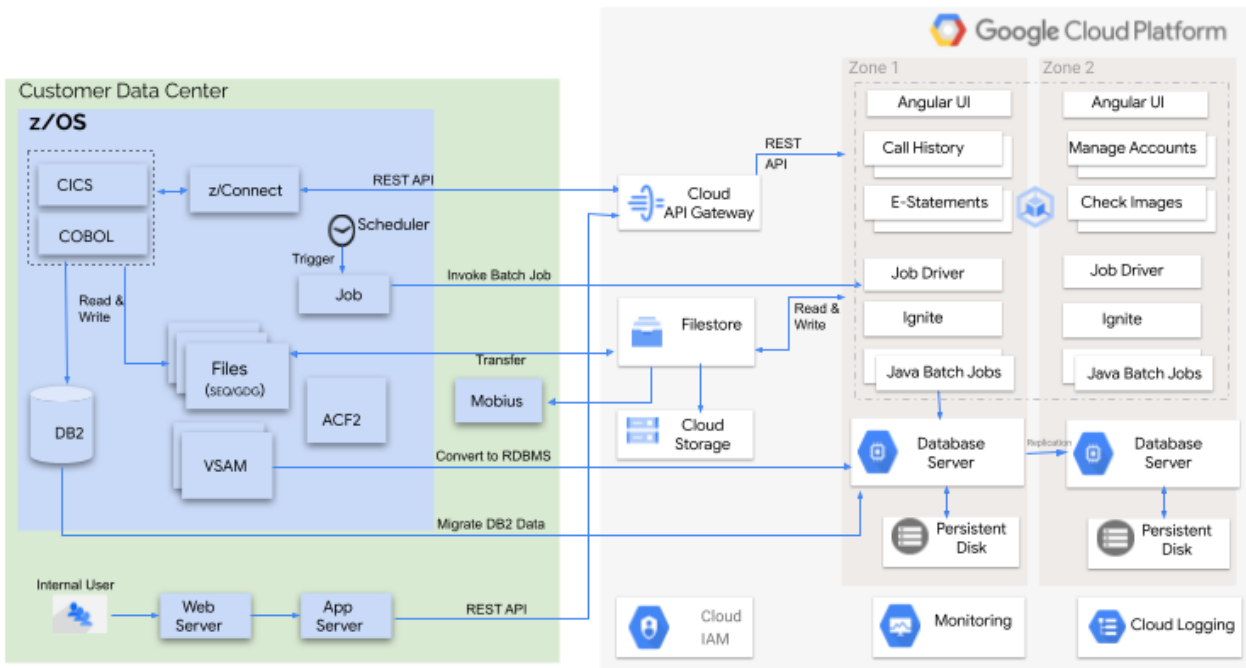
G4 Key Features for iSeries





Recommended Architecture

Google’s approach to code conversion is to ensure that the converted code is dockerized and run in a container orchestration platform. This makes the converted code portable. The recommended target platform for the converted code is GKE due to the fact that batch jobs will create files and these files might need to be shared across multiple containers and require Google Cloud’s Filestore or an equivalent NFS file system. As depicted in the diagram below, the target GKE environment provides high availability, scalability, and recoverability. The diagram also demonstrates how to integrate with the mainframe, including scheduler.



During Migration, programs that provide different business functions such as Call History, Manage Accounts, etc can be packaged and deployed in separate containers.

This provides the first step in migrating to a services architecture.

Provides the capability to scale, and deploy separate services.



Thank you

For questions, examples, references:
Please contact mainframe@google.com
Google Cloud Consulting

