



**System and Organization Controls (SOC) 3
Report on the Google Cloud Platform System
Relevant to Security, Availability, and Confidentiality
For the Period 1 May 2019 to 30 April 2020**



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Management's Report on Its Assertions on the Effectiveness of Its Controls Over the Google Cloud Platform System Based on the Trust Services Criteria for Security, Availability, and Confidentiality

We, as management of, Google LLC ("Google" or "the Company") are responsible for:

- Identifying the Google Cloud Platform System (System) and describing the boundaries of the System, which are presented in Attachment A
- Identifying our principal service commitments and system requirements
- Identifying the risks that would threaten the achievement of its principal service commitments and system requirements that are the objectives of our system, which are presented in Attachment B
- Identifying, designing, implementing, operating, and monitoring effective controls over the Google Cloud Platform System (System) to mitigate risks that threaten the achievement of the principal service commitments and system requirements
- Selecting the trust services categories that are the basis of our assertion

We assert that the controls over the system were effective throughout the period 1 May 2019 to 30 April 2020, to provide reasonable assurance that the principal service commitments and system requirements were achieved based on the criteria relevant to security, availability, and confidentiality set forth in the AICPA's TSP section 100, *2017 Trust Services Criteria for Security, Availability, Processing Integrity, Confidentiality, and Privacy*.

Very truly yours,

Google LLC
17 June 2020



**Building a better
working world**

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Report of Independent Accountants

To the Management of Google LLC:

Scope

We have examined management's assertion, contained within the accompanying "Management's Report on Its Assertions on the Effectiveness of Its Controls over the Google Cloud Platform System Based on the Trust Services Criteria for Security, Availability and Confidentiality" (Assertion), that Google's controls over the Google Cloud Platform System (System) were effective throughout the period 1 May 2019 to 30 April 2020, to provide reasonable assurance that its principal service commitments and system requirements were achieved based on the criteria relevant to security, availability, and confidentiality (applicable trust services criteria) set forth in the AICPA's TSP section 100, *2017 Trust Services Criteria for Security, Availability, Processing Integrity, Confidentiality, and Privacy*.

Management's Responsibilities

Google's management is responsible for its assertion, selecting the trust services categories and associated criteria on which its assertion is based, and having a reasonable basis for its assertion. It is also responsible for:

- Identifying the Google Cloud Platform System (System) and describing the boundaries of the System
- Identifying its principal service commitments and system requirements and the risks that would threaten the achievement of its principal service commitments and service requirements that are the objectives of its system
- Identifying, designing, implementing, operating, and monitoring effective controls over the Google Cloud Platform System (System) to mitigate risks that threaten the achievement of the principal service commitments and system requirements

Our Responsibilities

Our responsibility is to express an opinion on the Assertion, based on our examination. Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants (AICPA). Those standards require that we plan and perform our examination to obtain reasonable assurance about whether management's assertion is fairly stated, in all material respects. An examination involves performing procedures to obtain evidence about management's assertion, which includes: (1) obtaining an understanding of Google's relevant security, availability, and confidentiality policies, processes and controls, (2) testing and evaluating the operating effectiveness of the controls, and (3) performing such other procedures as we considered necessary in the circumstances. The nature, timing, and extent of the procedures selected depend on our judgment, including an assessment of the risk of material



misstatement, whether due to fraud or error. We believe that the evidence obtained during our examination is sufficient to provide a reasonable basis for our opinion.

Our examination was not conducted for the purpose of evaluating Google's cybersecurity risk management program. Accordingly, we do not express an opinion or any other form of assurance on its cybersecurity risk management program.

Inherent limitations

Because of their nature and inherent limitations, controls may not prevent, or detect and correct, all misstatements that may be considered relevant. Furthermore, the projection of any evaluations of effectiveness to future periods, or conclusions about the suitability of the design of the controls to achieve Google's principal service commitments and system requirements, is subject to the risk that controls may become inadequate because of changes in conditions, that the degree of compliance with such controls may deteriorate, or that changes made to the system or controls, or the failure to make needed changes to the system or controls, may alter the validity of such evaluations. Examples of inherent limitations of internal controls related to security include (a) vulnerabilities in information technology components as a result of design by their manufacturer or developer; (b) breakdown of internal control at a vendor or business partner; and (c) persistent attackers with the resources to use advanced technical means and sophisticated social engineering techniques specifically targeting the entity.

Opinion

In our opinion, Google's controls over the system were effective throughout the period 1 May 2019 to 30 April 2020, to provide reasonable assurance that its principal service commitments and system requirements were achieved based on the applicable trust services criteria.

Ernst & Young LLP

17 June 2020
San Jose, CA

Attachment A - Google Cloud Platform System

Google Cloud Platform

Google LLC ("Google" or "the Company") is a global technology service provider focused on improving the ways people connect with information. Google's innovations in web search and advertising have made Google's website one of the most viewed Internet destinations and its brand among the most recognized in the world. Google maintains one of the world's largest online index of websites and other content, and makes this information freely available to anyone with an Internet connection. Google's automated search technology helps people obtain nearly instant access to relevant information from their vast online index.

Google Cloud Platform provides Infrastructure as a Service (IaaS) and Platform as a Service (PaaS), allowing businesses and developers to build and run any or all of their applications on Google's Cloud infrastructure. Customers can benefit from performance, scale, reliability, ease-of-use, and a pay-as-you-go cost model.

It includes the following services, hereafter described collectively as "Google Cloud Platform" or GCP:

AI and Machine Learning

- AI Platform Data Labeling*
- AI Platform Notebooks
- AI Platform Training and Prediction
- AutoML Natural Language
- AutoML Tables
- AutoML Translation
- AutoML Video
- AutoML Vision
- Cloud Natural Language API
- Cloud Translation
- Cloud Vision
- Dialogflow
- Speech-to-Text
- Text-to-Speech
- Video Intelligence API

Compute

- App Engine
- Cloud Functions
- Cloud Functions for Firebase
- Cloud Run (fully managed)
- Compute Engine
- Google Kubernetes Engine

Data Analytics

- BigQuery
- BigQuery Data Transfer Service
- Cloud Life Sciences (formerly Google Genomics)
- Data Catalog
- Dataflow
- Datalab
- Dataproc
- Pub/Sub

Developer Tools

- Cloud Build
- Cloud SDK
- Cloud Source Repositories
- Container Registry

Identity and Security

- Access Approval*
- Access Context Manager
- Access Transparency
- Cloud Asset Inventory*
- Cloud Data Loss Prevention
- Cloud HSM
- Cloud Key Management Service
- Event Threat Detection*
- Firebase Authentication
- Identity & Access Management
- Identity Platform
- Identity-Aware Proxy
- Managed Service for Microsoft Active Directory (AD)*
- Resource Manager API
- Security Command Center*
- Service Control
- VPC Service Controls
- Web Security Scanner

Management Tools

- Cloud Console
- Cloud Console App
- Cloud Deployment Manager
- Cloud Shell
- Stackdriver Debugger
- Stackdriver Error Reporting

- Stackdriver Logging
- Stackdriver Profiler
- Stackdriver Trace

Networking

- Cloud CDN
- Cloud DNS
- Cloud Interconnect
- Cloud Load Balancing
- Cloud NAT (Network Address Translation)
- Cloud Router
- Cloud VPN
- Google Cloud Armor
- Network Service Tiers
- Traffic Director*
- Virtual Private Cloud (VPC)

Storage and Databases

- Cloud Bigtable
- Cloud Spanner
- Cloud SQL
- Cloud Storage
- Cloud Storage for Firebase
- Datastore
- Filestore
- Firestore
- Memorystore
- Persistent Disk
- Storage Transfer Service

Other

- Apigee Hybrid*
- Cloud Billing API
- Cloud Endpoints
- Cloud Healthcare
- Firebase Test Lab
- GCP Marketplace
- Hub*
- IoT Core
- Orbitera
- Service Consumer Management
- Service Management
- Talent Solution

*Indicates products in scope for the period 1 November 2019 through 30 April 2020

Google's product offerings for Google Cloud Platform provide the unique advantage of leveraging the resources of Google's core engineering team while also having a dedicated team to develop solutions for the corporate market. As a result, these Google offerings are positioned to innovate at a rapid rate and provide the same level of service that users are familiar with on google.com.

These products provide a comprehensive variety of technical services that organizations rely on:

- AI and Machine Learning - fast, scalable and easy to use modern machine learning services, with pre-trained models and the ability to generate tailored models
- Compute - a scalable range of computing options tailored to match the size and needs of an organization
- Data Analytics - tools to capture, process, store and analyze data on a single platform
- Developer Tools - a rich collection of tools and libraries that help development teams work quickly and effectively
- Identity and Security - manage the security and access to cloud assets, supported by Google's own protection of its infrastructure
- Management Tools - manage apps on GCP with a web-based console, mobile app, or Cloud Shell for real time monitoring, logging, diagnostics, and configuration
- Networking - a high quality private network using software-defined networking and distributed systems technologies to host and deliver services around the world
- Storage and Databases - scalable storage options and varieties for different needs and price points

The products are comprised of communication, productivity, collaboration and security tools that can be accessed from virtually any location with Internet connectivity. This means every employee and each user entity they work with can be productive from anywhere, using any device with an Internet connection.

The Google Cloud Platform products covered in this system description consist of the following services:

AI and Machine Learning

AI Platform Data Labeling

AI Platform Data Labeling is a service that helps developers obtain data to train and evaluate their machine learning models. It supports labeling for image, video, text, and audio as well as centralized management of labeled data.

AI Platform Notebooks

AI Platform Notebooks is a managed service that offers an integrated JupyterLab environment in which machine learning developers and data scientists can create running instances with data science and machine learning frameworks in a single click.

AI Platform Training and Prediction

AI Platform Training and Prediction is a managed service that enables users to easily build machine learning models with popular frameworks like TensorFlow, XGBoost and Scikit Learn. It provides scalable training and prediction services that work on large datasets.

AutoML Natural Language

AutoML Natural Language enables categorization of input text into their own custom defined labels (supervised classification). Models can be specific for a domain or use case.

AutoML Tables

AutoML Tables enables data scientists, analysts, and developers to automatically build and deploy machine learning models on structured data at increased speed and scale.

AutoML Translation

AutoML Translation enables training of custom models with limited machine learning expertise so translation queries return results specific to their domain. After uploading translated language pairs, AutoML Translation will train and deploy a model that can scale as needed to meet production demands. AutoML Translation offers the ability to create a production-ready model in a short amount of time.

AutoML Video

AutoML Video delivers a simple and flexible machine learning service that lets businesses and customer developers train custom and scalable video models for specific domain or use cases.

AutoML Vision

AutoML Vision enables training of custom models to classify images according to defined labels. After uploading and labeling images, Cloud AutoML Vision will train a model and manage deployment to adapt to demands. Cloud AutoML Vision offers high model accuracy and fast time to create a production-ready model. It also supports models to detect objects in images, and download classification-only models for use on edge devices.

Cloud Natural Language API

Cloud Natural Language API provides natural language understanding as a simple to use Application Programming Interface (API). Given a block of text, this API enables finding entities, analyzing sentiment (positive or negative), analyzing syntax (including parts of speech and dependency trees), and categorizing the content into a rich taxonomy. The API can be called by passing the content directly or by referring to a document in Google Cloud Storage.

Cloud Translation

Cloud Translation automatically translates text from one language to another language (e.g., French to English). The API is used to programmatically translate text in webpages or apps.

Cloud Vision

Cloud Vision enables the understanding of image content by encapsulating machine learning models in a REST API. It classifies images into thousands of categories, detects individual objects

and faces within images, and finds and reads printed words contained within images. It can be applied to build metadata on image catalogs, moderate offensive content, or enable new marketing scenarios through image sentiment analysis. It can also analyze images uploaded in the request and integrate with image storage on Google Cloud Storage.

Dialogflow

Dialogflow is a development suite for voice and text conversational apps including chatbots. Dialogflow is cross-platform and can connect to apps (on the web, Android, iOS, and IoT) or existing platforms (e.g., Actions on Google, Facebook Messenger, Slack).

Speech-to-Text

Speech-to-Text allows converting audio to text by applying neural network models in an API. The API can recognize over 80 languages and variants. Users can transcribe the text of users dictating to an application's microphone, enable command-and-control through voice, or transcribe audio files, among many other use cases. The API can receive streamed audio or a URL to audio stored in Google Cloud Storage.

Text-to-Speech

Text-to-Speech synthesizes natural-sounding speech with 30 voices, available in multiple languages and variants to deliver high fidelity audio, creating lifelike interactions across many applications and devices.

Video Intelligence API

Video Intelligence API makes videos searchable, and discoverable, by extracting metadata through a REST API. It annotates videos stored in Google Cloud Storage, and helps identify key noun entities in a video and when they occur within the video.

Compute

App Engine

App Engine enables the building and hosting of web apps on the same systems that power Google applications. App Engine offers fast development and deployment. There is no need to manage servers or other low-level infrastructure components. Scaling and software patching are handled by App Engine on the user's behalf. App Engine also provides the ability to create managed VMs. In addition, client APIs can be built for App Engine applications using Google Cloud Endpoints.

Cloud Functions

Cloud Functions is a serverless compute solution that runs single-purpose functions in response to GCP events and HTTP calls (webhooks). Cloud Functions can be triggered asynchronously by Cloud Pub/Sub, Cloud Storage, GCP infrastructure events, and Firebase products. Cloud Functions scales automatically to meet request load and the user does not need to manage servers or the runtime environment.

Cloud Functions for Firebase

Cloud Functions for Firebase are developer tools used for development and deployment of Google Cloud Functions. Cloud Functions enable developers to run their own backend code that executes automatically based on HTTP requests and Firebase and Google Cloud Platform events. Developers functions are stored in Google's cloud and run in a managed Node.js environment.

Cloud Run (fully managed)

Cloud Run (fully managed) is a serverless, managed compute platform that automatically scales stateless HTTP containers, running requests or event-driven stateless workloads. Cloud Run provides the flexibility to run services on a fully managed environment.

Compute Engine

Compute Engine offers scalable and flexible virtual machine computing capabilities in the cloud. With virtual machines that can boot in minutes, it offers many configurations including custom machine types that can be optimized for specific use cases as well as support for Graphics Processing Units (GPUs), Tensor Processing Units (TPUs) and Local SSD. Additionally, customers can enable Shielded VMs to provide advanced platform security.

Google Kubernetes Engine

Google Kubernetes Engine, powered by the open source container scheduler Kubernetes, runs containers on Google Cloud Platform. Kubernetes Engine manages provisioning and maintaining the underlying virtual machine cluster, scaling applications, and operational logistics such as logging, monitoring, and cluster health management.

Data Analytics

BigQuery

BigQuery is a fully managed data analysis service that features scalable data storage, up to hundreds of terabytes, the ability to perform ad hoc queries on multi-terabyte datasets, and the ability to share data insights via the web.

BigQuery Data Transfer Service

BigQuery Data Transfer Service automates data movement from Software as a Service (SaaS) applications to BigQuery on a scheduled, managed basis.

Cloud Life Sciences (formerly Google Genomics)

Cloud Life Sciences provides an Application Programming Interface (API) to store, process, inspect and share DNA sequence reads, reference-based alignments, and variant calls, using Google's cloud infrastructure.

Data Catalog

Data Catalog is a fully managed and scalable metadata management service that allows organizations to have a centralized and unified view of data assets.

Dataflow

Dataflow is a fully managed service for consistent, parallel data-processing pipelines. It utilizes the Apache Beam Software Development Kits (SDKs) with composable primitives for building data-processing pipelines for batch or continuous processing. This service manages the lifecycle of Compute Engine resources for the processing pipeline(s), and provides a monitoring interface for understanding pipeline health.

Datalab

Datalab is an interactive notebook-based tool for exploration, transformation, analysis and visualization of data on Google Cloud Platform. It provides analytical and storage services to analyze data on the platform.

Dataproc

Dataproc is a managed service for distributed data processing. It provides management, integration, and development tools for deploying and using Apache Hadoop, Apache Spark, and other related open source data processing tools. With Cloud Dataproc, clusters can be created and deleted on-demand and sized to fit whatever workload is at hand.

Pub/Sub

Pub/Sub provides reliable, many-to-many, asynchronous messaging between applications. Publisher applications can send messages to a topic while other applications can subscribe to that topic to receive the messages. By decoupling senders and receivers, Cloud Pub/Sub allows communication between independent applications.

Developer Tools

Cloud Build

Cloud Build allows for the creation of container images from application source code located in Google Cloud Storage or in a third-party service (e.g., Github, Bitbucket). Created Container images can be stored in Container Registry and deployed on Container Engine, Compute Engine, App Engine Flexible Environment or other services to run applications from Docker containers.

Cloud SDK

Cloud SDK is a set of command-line tools for the Google Cloud Platform that can be run interactively or in automated scripts. These tools can be used to manage supported Google Cloud Platform products, including Compute Engine virtual machines, Kubernetes clusters, network and firewall configurations, and disk storage.

Cloud Source Repositories

Cloud Source Repositories provides Git version control to support collaborative development of any application or service as well as a source browser that can be used to browse the contents of repositories and view individual files from within the Cloud Console. Cloud Source Repositories and related tools (e.g., Stackdriver Debugger) can be used to view debugging information alongside code during application runtime.

Container Registry

Container Registry is a private Docker image storage system on Google Cloud Platform.

Identity and Security

Access Approval

Access Approval allows customers to approve eligible manual, targeted access by Google administrators to their data or workloads prior to access being granted.

Access Context Manager

Access Context Manager allows customer administrators to define attribute-based access control for projects, apps and resources.

Access Transparency

Access Transparency captures near real-time logs of certain manual, targeted accesses by Google personnel, and provides them via Stackdriver Logging accounts.

Cloud Asset Inventory

Cloud Asset Inventory is a service that allows customers to view, monitor, and analyze cloud assets with history. It enables users to export cloud resource metadata at a given timestamp or cloud resource metadata history within a time window.

Cloud Data Loss Prevention

Cloud Data Loss Prevention (DLP) enables classifying, redacting, and analyzing sensitive or personally identified content in text, images, and cloud assets.

Cloud HSM

Cloud HSM is a cloud-hosted Hardware Security Module (HSM) service for hosting encryption keys and performing cryptographic operations.

Cloud Key Management Service

Cloud Key Management Service (KMS) is a cloud-hosted key management service that manages encryption for cloud services. It enables the generation, use, rotation, and destruction of encryption keys.

Event Threat Detection

Event Threat Detection is a log monitoring tool which helps detect security threats in Google Cloud Platform environments. Threat findings are written to the Security Command Center and optionally to Cloud Logging.

Firebase Authentication

Firebase Authentication is a fully managed user identity and authentication system providing backend services enabling sign-in and sign-up experiences for an application or service.

Identity & Access Management

Identity & Access Management (IAM) enables the administration and authorization of accesses to specific resources, and provides a unified view into security policies across entire organizations with built-in auditing.

Identity Platform

Identity Platform is a customer identity and access management (CIAM) platform delivered by Google Cloud enabling organizations to add identity management and user security to their applications or services.

Identity-Aware Proxy

Identity-Aware Proxy (Cloud IAP) is a tool that helps control access to applications running on Google Cloud Platform based on identity and group membership.

Managed Service for Microsoft Active Directory (AD)

Managed Service for Microsoft Active Directory (AD) is a Google Cloud service running Microsoft AD that enables customers to deploy, configure and manage cloud-based AD-dependent workloads and applications. It is a fully managed service that is highly available, applies network firewall rules, and keeps AD servers updated with Operating System patches.

Resource Manager API

Resource Manager API allows users to programmatically manage Google Cloud Platform container resources (such as Organizations and Projects) to group and hierarchically organize other Google Cloud Platform resources. This hierarchical organization enables users to management of common aspects of resources such as access control and configuration settings.

Security Command Center

Security Command Center is a dashboard and analytics service that enables customers to prevent, detect, and respond to Google Cloud security and data threats.

Service Control

Service Control provides control plane functionality to managed services, such as logging, monitoring, and status checks.

VPC Service Controls

VPC Service Controls provides administrators with the ability to configure security perimeters around resources of API based cloud services (such as Cloud Storage, BigQuery, Bigtable) and limit access to authorized VPC networks.

Web Security Scanner

Web Security Scanner is a web application security scanner for Google App Engine. It provides the ability to check for a subset of common web application vulnerabilities in websites built on App Engine.

Management Tools

Cloud Console

Cloud Console is a web-based interface used to build, modify, and manage services and resources on the Google Cloud Platform. Cloud services can be procured, configured, and run from Cloud Console.

Cloud Console App

Cloud Console App is a native mobile app that provides monitoring, alerting, and the ability to take actions on resources.

Cloud Deployment Manager

Cloud Deployment Manager is an infrastructure management service which automates creation, and management of Google Cloud Platform resources.

Cloud Shell

Cloud Shell provides command-line access to Google Cloud Platform resources through an in-browser Linux shell backed by a temporary Linux VM in the cloud. It allows projects and resources to be managed without having to install additional tools on systems and comes equipped and configured with common developer tools such as text editors, a MySQL client and Kubernetes.

Stackdriver Debugger

Stackdriver Debugger provides the ability to inspect the call-stack and variables of a running cloud application in real-time without stopping it. It is safe to use in test, production or any other deployment environment. It can be used to debug applications written in supported languages.

Stackdriver Error Reporting

Stackdriver Error Reporting counts, analyzes and aggregates the crashes in applications. The crash data is extracted from application logs on Google Cloud or reported via the public API. Collected data can be inspected via the user interface (UI) or the public API and may opt-in to receive notifications about the occurrence of errors.

Stackdriver Logging

Stackdriver Logging is a fully managed service that provides a service to store, search, analyze, monitor, and alert of log data and events from Google Cloud Platform and Amazon Web Services (AWS). The API also allows ingestion of custom log data from any source. Stackdriver Logging can ingest application and system log data from thousands of VMs and analyze log data in real-time. Software related to Stackdriver Logging (i.e. open-source logging agent) that can be downloaded and installed on independent VMs is out of the scope of this report.

Stackdriver Profiler

Stackdriver Profiler continuously gathers and reports source-level performance information from production services. It provides key information to determine what functions in code consume the most memory and CPU cycles so insights can be gained on how code operates to improve performance and optimize computing resources.

Stackdriver Trace

Stackdriver Trace collects latency data from applications and displays it in the Google Cloud Platform Console. It automatically analyzes trace data to generate in-depth performance reports that help identify and locate performance bottlenecks.

Networking

Cloud CDN

Cloud CDN (Content Delivery Network) uses Google's distributed edge points of presence to cache HTTP(S) load balanced content.

Cloud DNS

Cloud DNS is a fully managed Domain Name System (DNS) service which operates a geographically diverse network of high-availability authoritative name servers. Cloud DNS provides a service to publish and manage DNS records for applications and services.

Cloud Interconnect

Cloud Interconnect offers enterprise-grade connections to Google Cloud Platform. This solution provides direct connection between on-premise networks and GCP Virtual Private Cloud.

Cloud Load Balancing

Cloud Load Balancing is a distributed, software-defined, managed service for all traffic (HTTP(S), TCP/SSL, and UDP) to computing resources. Cloud Load Balancing rapidly responds to changes in traffic, network, backend health and other related conditions.

Cloud NAT (Network Address Translation)

Cloud NAT (Network Address Translation) enables virtual machine instances in a private network to communicate with the internet, without external IP addresses.

Cloud Router

Cloud Router enables dynamic Border Gateway Protocol (BGP) route updates between a Virtual Private Cloud (VPC) network and an external network, typically an on-premise network.

Cloud VPN

Cloud VPN provides connections between on-premise or other external networks to Virtual Private Clouds on GCP via an IPsec connection or can be used to connect two different Google managed VPN gateways.

Google Cloud Armor

Google Cloud Armor provides access control configurations and at-scale defenses against application-aware and multi-vector attacks.

Network Service Tiers

Network Service Tiers enable the selection of different quality networks (tiers) for outbound traffic to the internet: Standard Tier primarily utilizes third-party transit providers while Premium Tier leverages Google's private backbone and peering surface for egress.

Traffic Director

Traffic Director is Google Cloud Platform's traffic management service for open-source service meshes.

Virtual Private Cloud (VPC)

Virtual Private Cloud is a comprehensive set of managed networking capabilities including granular IP address range selection, routes and firewalls.

Storage and Databases

Cloud Bigtable

Cloud Bigtable is a low-latency, fully managed, highly scalable NoSQL database service. It is designed for the retention and serving of data from gigabytes to petabytes in size.

Cloud Spanner

Cloud Spanner is a fully managed, scalable, relational database service. It is designed to provide a scalable online transaction processing (OLTP) database with high availability and ACID (Atomicity, Consistency, Isolation, Durability) transactions with synchronous replication of data across regions.

Cloud SQL

Cloud SQL is a service to create, configure, and use managed third-party relational databases in Google Cloud Platform. Cloud SQL maintains, manages, and administers those databases.

Cloud Storage

Cloud Storage is Google Cloud Platform's unified object/blob storage. It is a RESTful service for storing and accessing data on Google Cloud Platform's infrastructure. It combines the simplicity of a consistent API and latency across different storage classes with reliability, scalability, performance and security of Google Cloud Platform.

Cloud Storage for Firebase

Cloud Storage for Firebase adds customizable Google security (via Firebase Security Rules for Cloud Storage) to file uploads and downloads for Firebase apps. Cloud Storage for Firebase is backed by Google Cloud Storage, a service for storing and accessing data on Google's infrastructure.

Datastore

Datastore is a highly-scalable NoSQL database for mobile and web applications. It provides query capabilities, atomic transitions, indexes, and automatically scales up and down in response to load.

Filestore

Filestore is a service for fully managed Network File System (NFS) file servers for use with applications running on Compute Engine virtual machines (VMs) instances or Google Kubernetes Engine clusters.

Firestore

Firestore is a fully managed, scalable, serverless NoSQL document database for mobile, web, and server development. It provides query capabilities, live synchronization and offline support.

Memorystore

Memorystore for Redis provides a fully managed in-memory data store service for GCP. Cloud Memorystore can be used to build application caches that provides low latency data access. Cloud Memorystore is compatible with the Redis protocol, allowing seamless migration with no code changes.

Persistent Disk

Persistent Disk provides a persistent virtual disk for use with Google Compute Engine and Google Kubernetes Engine compute instances. It is available in both SSD (Solid State Drive) and HDD (Hard Disk Drive) variations.

Storage Transfer Service

Storage Transfer Service provides the ability to import large amounts of online data into Google Cloud Storage. It can transfer data from Amazon Simple Storage Service (Amazon S3) and other HTTP/HTTPS locations as well as transfer data between Google Cloud Storage buckets.

Other

Apigee Hybrid

Apigee Hybrid is a full-lifecycle API management platform that lets customers design, secure, analyze, and scale APIs, giving them visibility and control. It consists of a management plane hosted on Google Cloud Platform and a runtime plane that is managed by the customer.

Cloud Billing API

Cloud Billing API provides methods to programmatically manage billing for projects on the Google Cloud Platform.

Cloud Endpoints

Cloud Endpoints is a tool that provides services to develop, deploy, secure and monitor APIs running on Google Cloud Platform.

Cloud Healthcare

Cloud Healthcare provides managed services and an API to store, process, manage, and retrieve healthcare data in a variety of industry standard formats.

Firebase Test Lab

Firebase Test Lab provides cloud-based infrastructure for testing apps on physical and virtual devices. Developers can test their apps across a wide variety of devices with Firebase Test Lab.

GCP Marketplace

Google Cloud Platform (GCP) Marketplace offers ready-to-go development stacks, solutions, and services from 3rd party partners and Google to accelerate development. It enables the deployment of production-grade solutions, obtains direct access to partner support, and receives a single bill for both GCP and 3rd party services.

Hub

Hub is a centralized control-plane that enables a user to centrally manage features and services on customer-registered clusters running in a variety of environments, including Google's cloud, on-premises in customer data centers, or other third-party clouds.

IoT Core

IoT Core is a fully managed service that securely connects, manages, and ingests data from internet connected devices. It enables utilization of other Google Cloud Platform services for collecting, processing, and analyzing IoT data.

Orbitera

Orbitera provides a platform that creates marketplaces to sell solutions, import billing data and generate reports and invoices, and create time-bound multi-cloud software trials.

Service Consumer Management

Service Consumer Management API provides utilities to help managed service producers manage relationships with service consumers, including the ability to create and manage tenancy units.

Service Management

Service Management API provides methods for publishing managed services and managing service configurations.

Talent Solution

Talent Solution offers access to Google's machine learning, enabling company career sites, job boards, ATS, staffing agencies, and other recruitment technology platforms to improve the talent acquisition experience. The solution includes both Job Search and Profile Search features to provide candidates and employers with an enhanced talent acquisition experience.

Data Centers

The above products are serviced from data centers operated by Google around the world. Below is a list of Google's production data center locations that host the above products and operations for Google Cloud Platform:

- Arcola (VA), United States of America
- Ashburn (1) (VA), United States of America
- Ashburn (2) (VA), United States of America
- Ashburn (3) (VA), United States of America
- Atlanta (1) (GA), United States of America
- Atlanta (2) (GA), United States of America
- Changhua, Taiwan
- Clarksville (TN), United States of America
- Council Bluffs (1) (IA), United States of America
- Council Bluffs (2) (IA), United States of America
- Dublin, Ireland
- Eemshaven, Groningen, the Netherlands
- Frankfurt (1), Hesse, Germany
- Frankfurt (2), Hesse, Germany
- Frankfurt (3), Hesse, Germany
- Ghlin, Hainaut, Belgium
- Hamina, Finland
- Hong Kong, Hong Kong
- Koto-ku, Tokyo, Japan
- Las Vegas (NV), United States of America
- Leesburg (VA), United States of America
- Lenoir (NC), United States of America
- London (1), United Kingdom
- London (2), United Kingdom
- Los Angeles (CA), United States of America
- Moncks Corner (SC), United States of America
- Montreal, Quebec, Canada
- Mumbai, India
- Osaka, Japan
- Osasco, Brazil
- Pryor Creek (OK), United States of America
- Quilicura, Santiago, Chile
- Salt Lake City (UT), United States of America
- Seoul, South Korea
- Sydney (1), NSW, Australia
- Sydney (2), NSW, Australia
- The Dalles (1) (OR), United States of America
- The Dalles (2) (OR), United States of America
- Vinhedo, Brazil

- Wenya, Singapore
- Widows Creek (AL), United States of America
- Zurich, Switzerland

Infrastructure

Google Cloud Platform runs in a multi-tenant, distributed environment. Rather than segregating user entity data to one machine or set of machines, data from all user entities is distributed amongst a shared infrastructure. For Google Cloud Platform, this is achieved through a Google distributed file system designed to store extremely large amounts of data across many servers. Structured data is then stored in large distributed databases, built on top of this file system.

Data Centers and Redundancy

Google maintains consistent policies and standards across all data centers for physical security and environmental safeguards to help protect production servers, network devices and network connections within Google data centers.

Redundant architecture exists such that data is replicated in real-time to at least two (2) geographically dispersed data centers. The data centers are connected through multiple encrypted network links and interfaces. This provides high availability by dynamically load balancing across those sites. Google uses a dashboard that provides details such as resource footprint, central processing unit capacity and random-access memory availability to monitor resource availability across their data centers and to validate that data has been replicated to more than one location.

Authentication and Access

Strong authentication and access controls are implemented to restrict access to Google Cloud Platform production systems, internal support tools, and customer data. Machine-level access restriction relies on a Google-developed distributed authentication service based on Transport Layer Security (TLS) certificates, which helps to positively identify the resource access requester. This service also offers transport encryption to enhance data confidentiality in transit. Data traffic is encrypted between Google production facilities.

Google follows a formal process to grant or revoke employee access to Google resources. Lightweight Directory Access Protocol (LDAP), Kerberos, and a Google proprietary system which utilizes Secure Shell (SSH) and TLS certificates help provide secure and flexible access mechanisms. These mechanisms are designed to grant access rights to systems and data only to authorized users.

Both user and internal access to customer data is restricted through the use of unique user account IDs. Access to sensitive systems and applications requires two-factor authentication in the form of a unique user account ID, strong passwords, security keys and/or certificates. Periodic reviews of access lists are implemented to help ensure access to customer data (and other need-to-know data) is appropriate and authorized. Access to production machines, network devices and support tools is managed via an access group management system. Membership in these groups must be approved by respective group administrators. User group memberships are reviewed on a semi-annual basis under the direction of the group administrators to help ensure

that access has been removed for employees who no longer have a business need for such access.

Change Management

Change Management policies, including security code reviews and emergency fixes, are in place, and procedures for tracking, testing, approving, and validating changes are documented. Changes are developed utilizing the code versioning tool to manage source code, documentation, release labeling and other functions. Google requires all code changes to be reviewed and approved by a separate technical resource, other than the developer, to evaluate quality and accuracy of changes. Further, all application and configuration changes are tested prior to migration to production environment. Following successful pass of tests, multiple binaries are then grouped into a release and deployed to production.

Data

Google provides controls at each level of data storage, access, and transfer. Google has established training programs for privacy and information security to support data confidentiality. All employees are required to complete these training programs annually. All product feature launches that include new collection, processing, or sharing of user data are required to go through an internal design review process. Google has also established incident response processes to report and handle events related to confidentiality. Google establishes agreements, including nondisclosure agreements, for preserving confidentiality of information and software exchange with external parties.

Network Architecture and Management

The Google Cloud Platform system architecture utilizes a fully redundant network infrastructure. Google has implemented perimeter devices to protect the Google network from external attacks. Network monitoring mechanisms are in place to prevent access to the Google network from unauthorized devices.

People

Google has implemented a process-based service quality environment designed to deliver the Google Cloud Platform products to customers. The fundamentals underlying the services provided are the adoption of standardized, repeatable processes; the hiring and development of highly skilled resources; and leading industry practices. Google has established internal compliance teams utilizing scalable processes to efficiently manage core infrastructure and product-related security, availability, and confidentiality controls.

Formal organizational structures exist and are available to Google employees on the Company's intranet. The intranet provides drill-down functionality for identifying employees in the functional operations team. Google has developed and documented formal policies, procedures, and job descriptions for operational areas including data center operations, security administration, system and hardware change management, hiring, training, performance appraisals, terminations, and incident escalation. These policies and procedures have been designed to segregate duties and enforce responsibilities based on job functionality. Policies and procedures are reviewed and updated as necessary.

Attachment B - Principal Service Commitments and System Requirements

With regard to the effect of the COVID-19 pandemic, there were no significant changes to the Google Cloud Platform System which resulted in a failure to meet Google's principal service commitments and system requirements.

Service Commitments

Commitments are declarations made by management to customers regarding the performance of Google Cloud Platform. Commitments to customers are communicated via Terms of Service, Google Cloud Platform Service Level Agreements, and Data Processing Addenda.

System Requirements

Google has implemented a process-based service quality environment designed to deliver the Google Cloud Platform System products to customers. These internal policies are developed in consideration of legal and regulatory obligations, to define Google's organizational approach and system requirements.

The delivery of these services depends upon the appropriate internal functioning of system requirements defined by Google to meet customer commitments.

The following processes and system requirements function to meet Google's commitments to customers with respect to the terms governing the processing and security of customer data:

- **Access Security:** Google maintains data access and logical security policies, designed to prevent unauthorized persons and/or systems from gaining access to systems used to process personal data. Access to systems is restricted based on the principle of least privilege
- **Change Management:** Google requires standard change management procedures to be applied during the design, development, deployment, and maintenance of all Google Applications, Systems, and Services
- **Incident Management:** Google monitors a variety of communication channels for security incidents, and Google's security personnel will react promptly to known incidents
- **Data Management:** Google complies with any obligations applicable to it with respect to the processing of Customer Personal Data. Google processes data in accordance with the customer instructions and complies with applicable regulations
- **Data Security:** Google implements and maintains technical and organizational measures to protect customer data against accidental or unlawful destruction, loss, alteration, unauthorized disclosure or access. Google takes appropriate steps to help ensure compliance with the security measures by its employees, contractors and sub-processors to the extent applicable to their scope of performance
- **Third Party Risk Management:** Google conducts routine inspections of sub-processors to evaluate control conformance. Google defines the security and privacy obligations which the sub-processor must meet to satisfy Google's obligations regarding customer data, prior to Google granting access to customer data