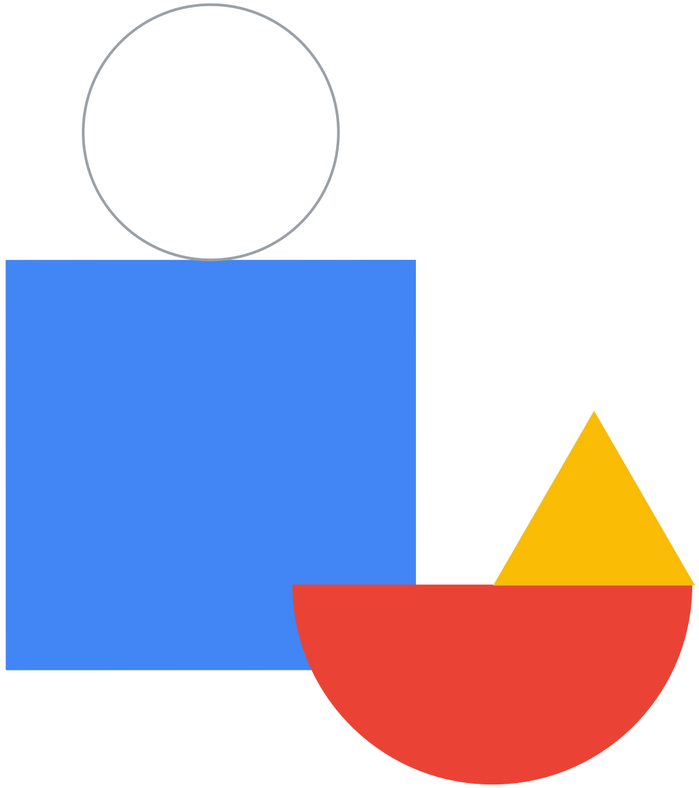
Google Cloud



Preparing for your Professional Cloud Security Engineer Journey

Module 5: Ensuring Compliance

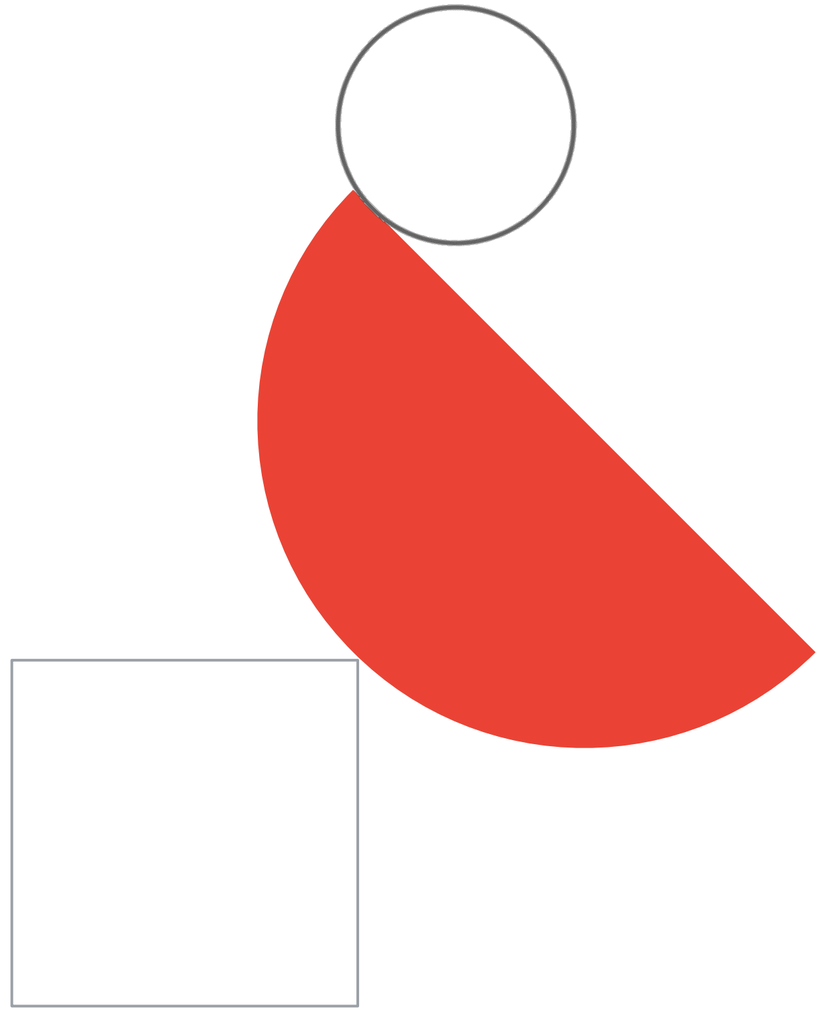
Module agenda

01 Cymbal Bank’s security regulatory compliance

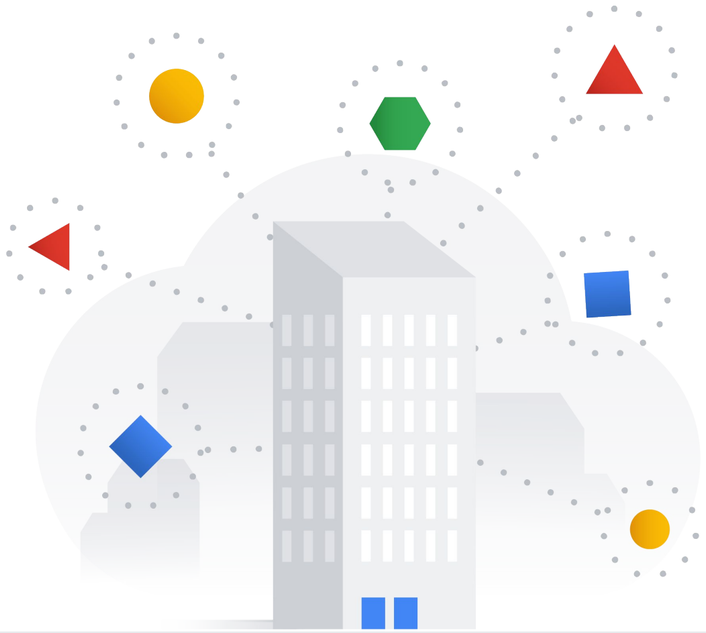
02 Diagnostic questions

03 Review and study planning

Cymbal Bank's security regulatory compliance



Ensuring security regulatory compliance at Cymbal Bank



- Determining regulatory requirements for the cloud

Cymbal Bank

Google Cloud meets many third-party and government compliance standards worldwide

- Google Cloud has been certified as secure, but that does not mean that applications built on Google Cloud are automatically certified.
- Cymbal Bank does not need to worry about getting Google Cloud tools and services certified, only those services you build on top of Google Cloud.

ISO/IEC 27001

HIPAA

FedRAMP

SOC 1

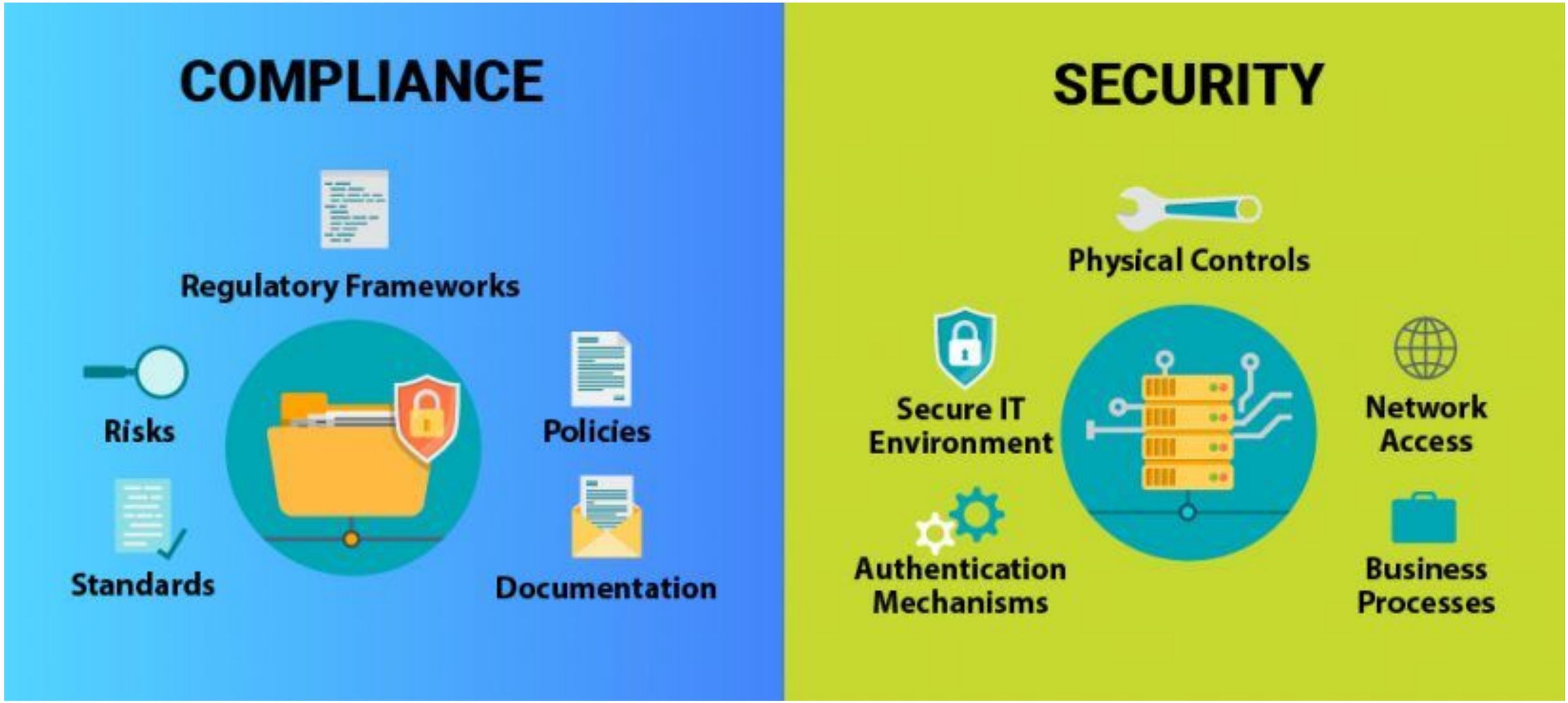
Compliance in GCP - 1/2

- **ISO 27001**
  - Requirements for an information security management system (ISMS), specifies a set of best practices
  - ONLY GUIDANCE, lays out allow Google to ensure a comprehensive and continually improving model for security management.
- **SOC 2**
  - The purpose of this report is to evaluate an organization's information systems relevant to security, availability, processing integrity, confidentiality, and privacy.
  - Relevant are different services: VPC Service Controls, DLP, Cloud Security Command Center, Cloud Armor etc
- **PCI DSS**
  - Appropriate practices that merchants and service providers should follow to protect cardholder data.
  - Relevant are MANY GCP services: networking, logging, encryption etc
- **FIPS 140-2**
  - A security standard that sets forth requirements for cryptographic modules, including hardware, software, and/or firmware, for U.S. federal agencies.
  - Google Cloud Platform uses a FIPS 140-2 validated encryption module called BoringCrypto (certificate 3318) in our production environment. This means that both data in transit to the customer and between data centers, and data at rest are encrypted using FIPS 140-2 validated encryption.

Compliance in GCP - 2/2

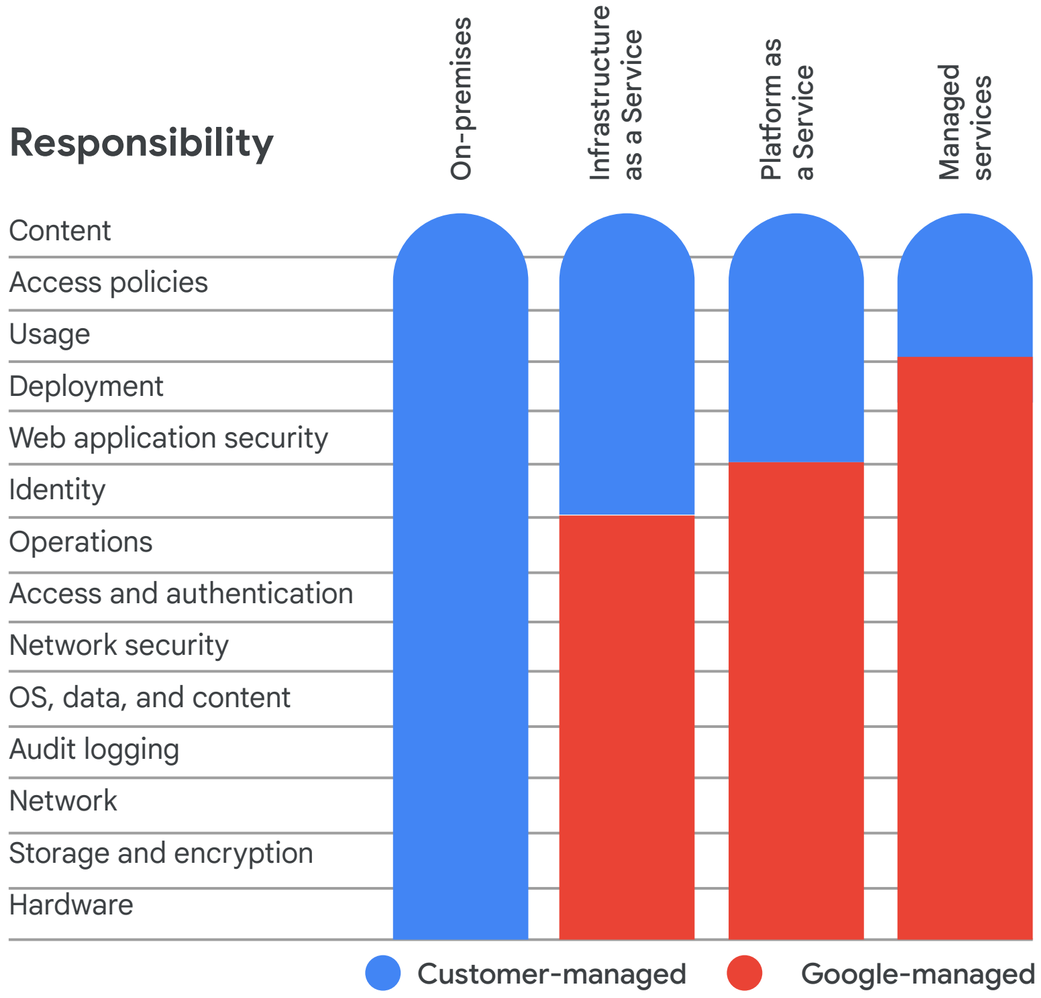
- **HIPAA**
  - Healthcare-related.
  - Complying with HIPAA is a shared responsibility between the customer and Google.
  - Google Cloud Platform supports HIPAA compliance (within the scope of a Business Associate Agreement) but ultimately customers are responsible for evaluating their own HIPAA compliance.
- **FedRAMP**
  - Government-wide program that provides a standardized approach to security assessment, authorization, and continuous monitoring for cloud products and services.
  - Risk impact levels (Low, Moderate, or High)
  - Google is one of the first hyperscale commercial cloud providers to achieve FedRAMP High on a commercial public cloud offering, and is one of the largest providers of FedRAMP services available on the market today.
  - NO SEPARATE 'GOVERNMENT' REGIONS EXIST IN GCP.
- **GDPR**
  - PII data protection in Europe.
  - Our customers own their data and we believe they should have the strongest levels of control over data stored in the cloud. Our public cloud provides customers with world-class levels of visibility and control over their data through our services.
  - Storing data in Europe, optionally manage encryption keys and store them outside of GCP, External Key Manager etc.

Security vs Compliance



Cymbal Bank collaborates with Google Cloud to ensure security compliance

- Google is responsible for managing its infrastructure security.
- You are responsible for securing your virtual infrastructure, workloads and data.
- Google helps you with best practices, templates, products, and solutions.



Security / compliance - related GCP services & features

Google Security Overview	Shielded VMs	Identity and Access Management
Access Transparency	Confidential Computing	IAM Conditions
GCP Compliance offerings	Shared VPC	Identity-Aware Proxy
Binary Authorization	VPC Service Controls	Resource Manager
Data Loss Prevention	Cloud Armor	Private Service Connect
Key Management Service	DNSSEC	Private Google Access
Organization Policy Service	Cloud VPN	Serverless VPC Access
Anthos Service Mesh	VPC Flow Logs	Web Security Scanner
Cloud Asset Inventory	Firewall Insights	Cloud Audit Logs
OS Login	Packet Mirroring	Centralized Telemetry

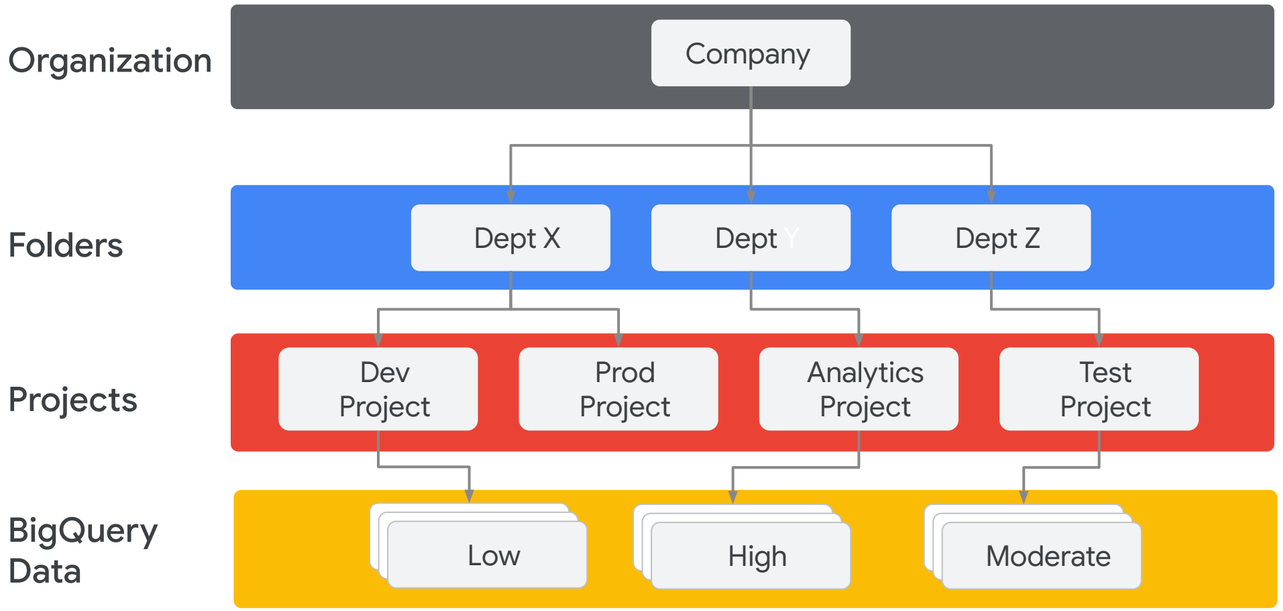
and more...

Encryption in the context of security compliance

- Default at rest encryption provided by Google Cloud
- Options for encryption at rest with varying degrees of control over keys and key storage
- Optional hardened hardware-based key storage with Cloud HSM
- Default encryption in motion when data is transferred across physical boundaries controlled by Google Cloud
- Optional application layer encryption in motion for auditable end-to-end encryption

Cloud DLP and granular access control for data security compliance

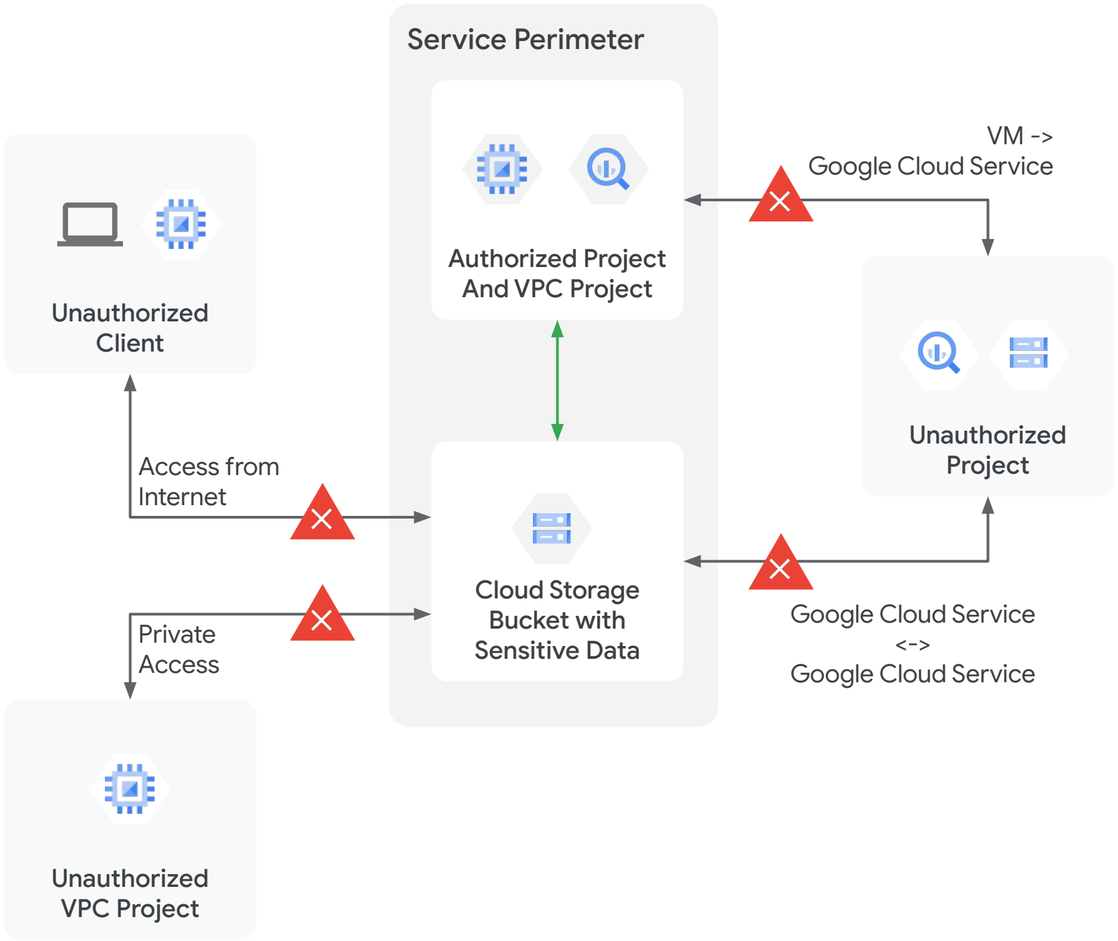
- Use Cloud DLP to scan, classify, and label data with metadata indicating sensitivity
- Transform sensitive data to allow processing while preventing exposure
- Apply granular access control to data to ensure correct access based on sensitivity



Automatic DLP across your entire BigQuery footprint to understand your sensitive data risk

VPC service controls for data residency and location-based access requirements

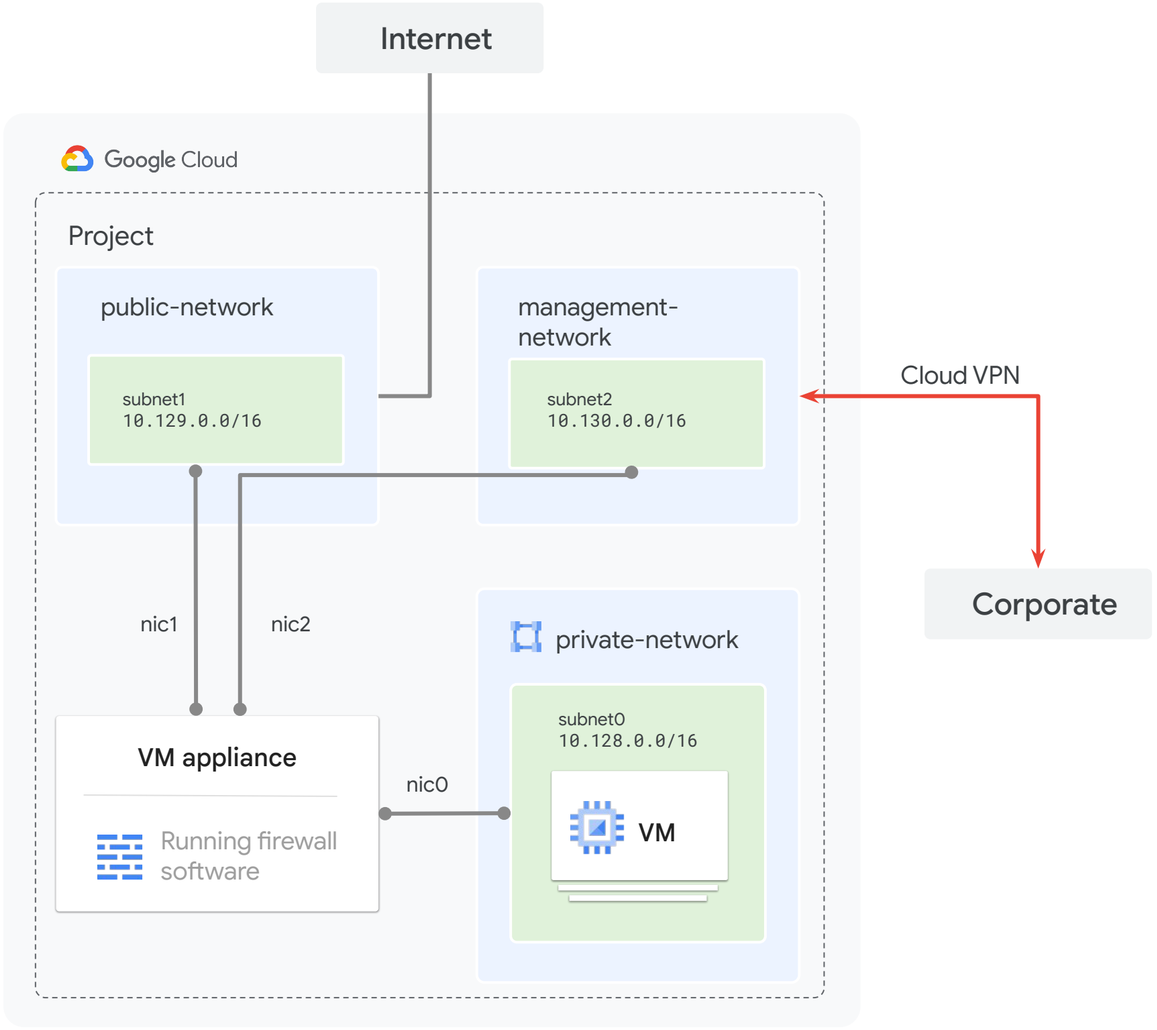
- Coupled with isolated VPC networks, services and data can be locked down to be accessible only from fixed hardened endpoints
- VPCs can be configured with subnets in only certain regions which when combined with VPC service controls can constrain access to data from only those locations



Network isolation to support regulatory compliance

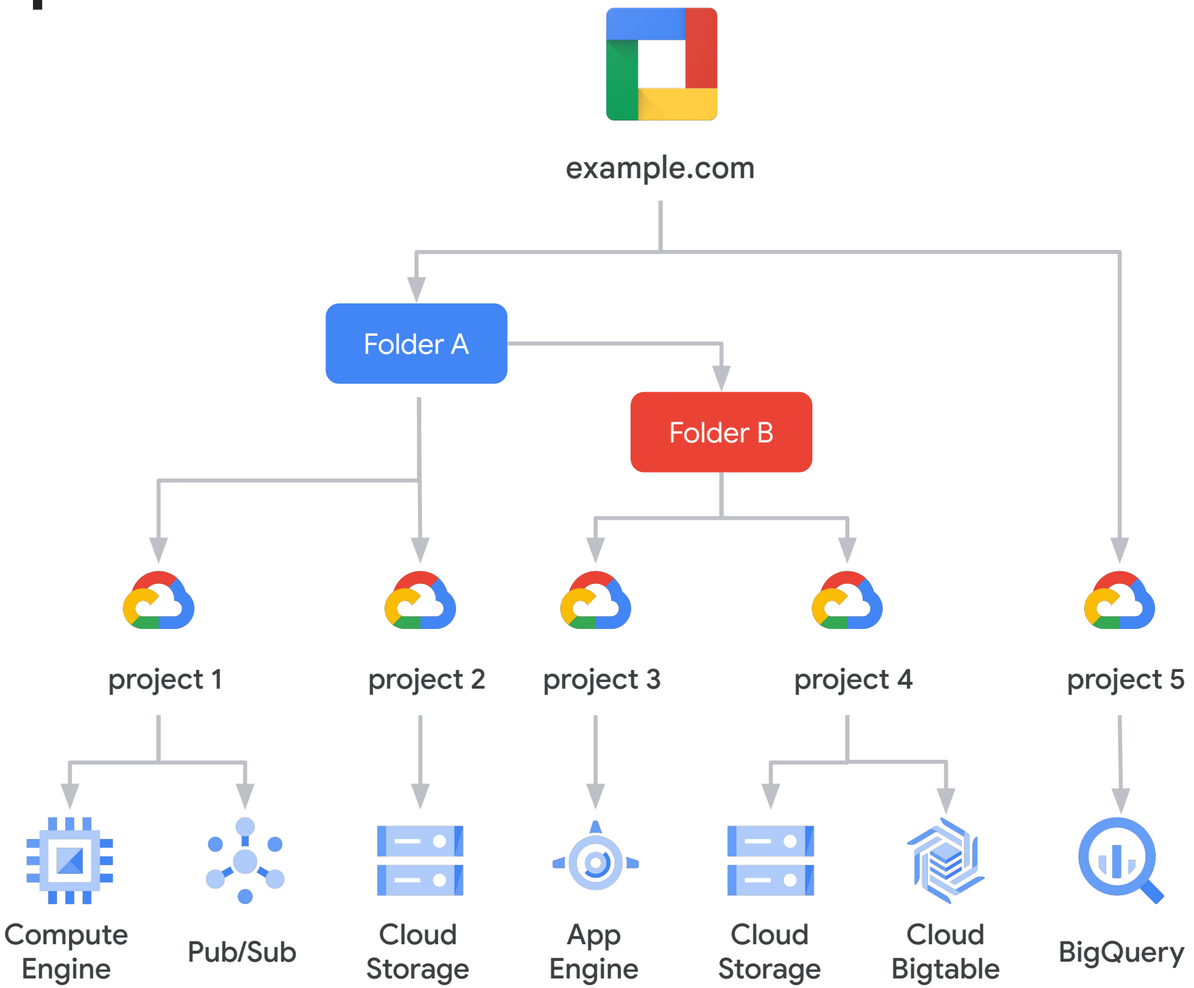
Separate isolated VPCs can:

- Guarantee better workload isolation.
- Help satisfy compliance requirements that depend on workload isolation.
- Facilitate meeting location-based requirements when combined with VPC service controls.



Setting policy to ensure compliance

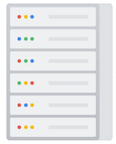
- Organization policy constraints can be applied to the organization or any folder or project and restrict how Google Cloud can be used.
- Compliance may require auditable least privilege and separation of duties in access control policies



Log compliance

Developer

Log concentrator



Auditor

Customer Organization

Service project A

global

_Default

_Required

_Default

_Required

PCI/DSS long-term

PCI/DSS searchable

Log collection project

us-west4

GCS

GDPR

Log views

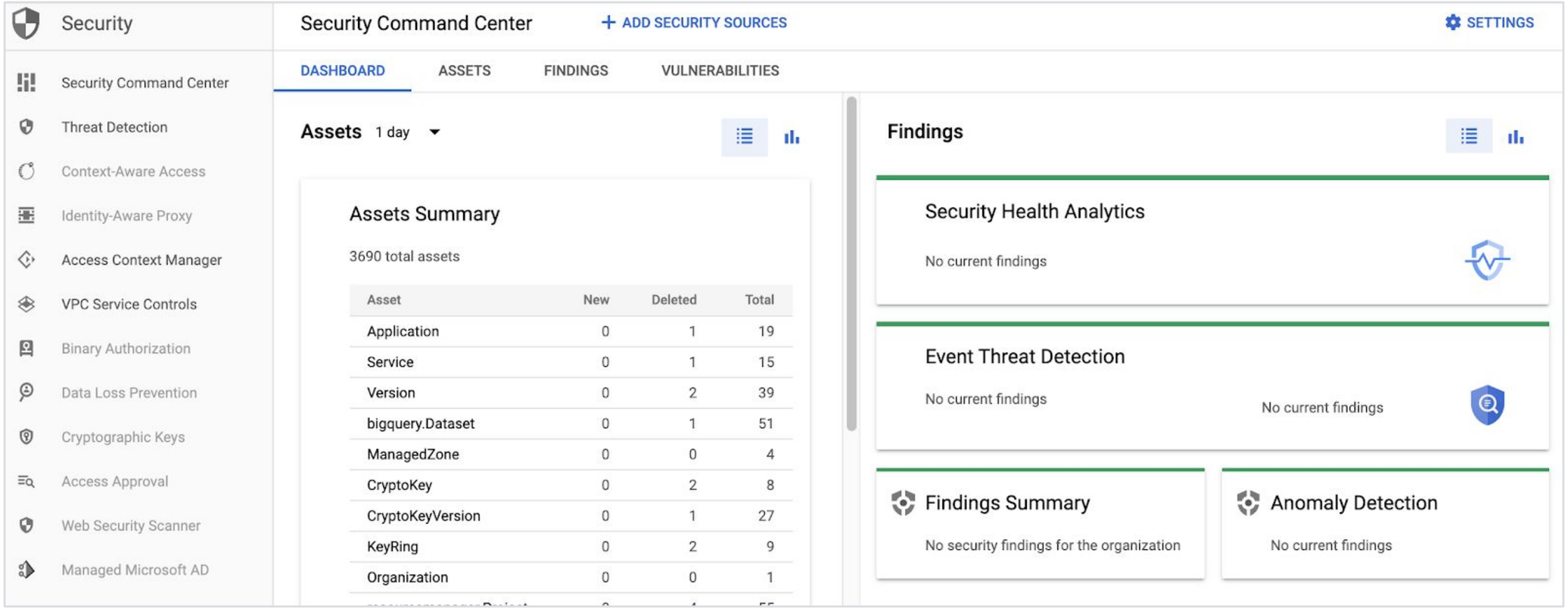
Custom

Audit logs

[Logs data: A step by step guide for overcoming common compliance challenges]

Google Cloud

Security Command Center

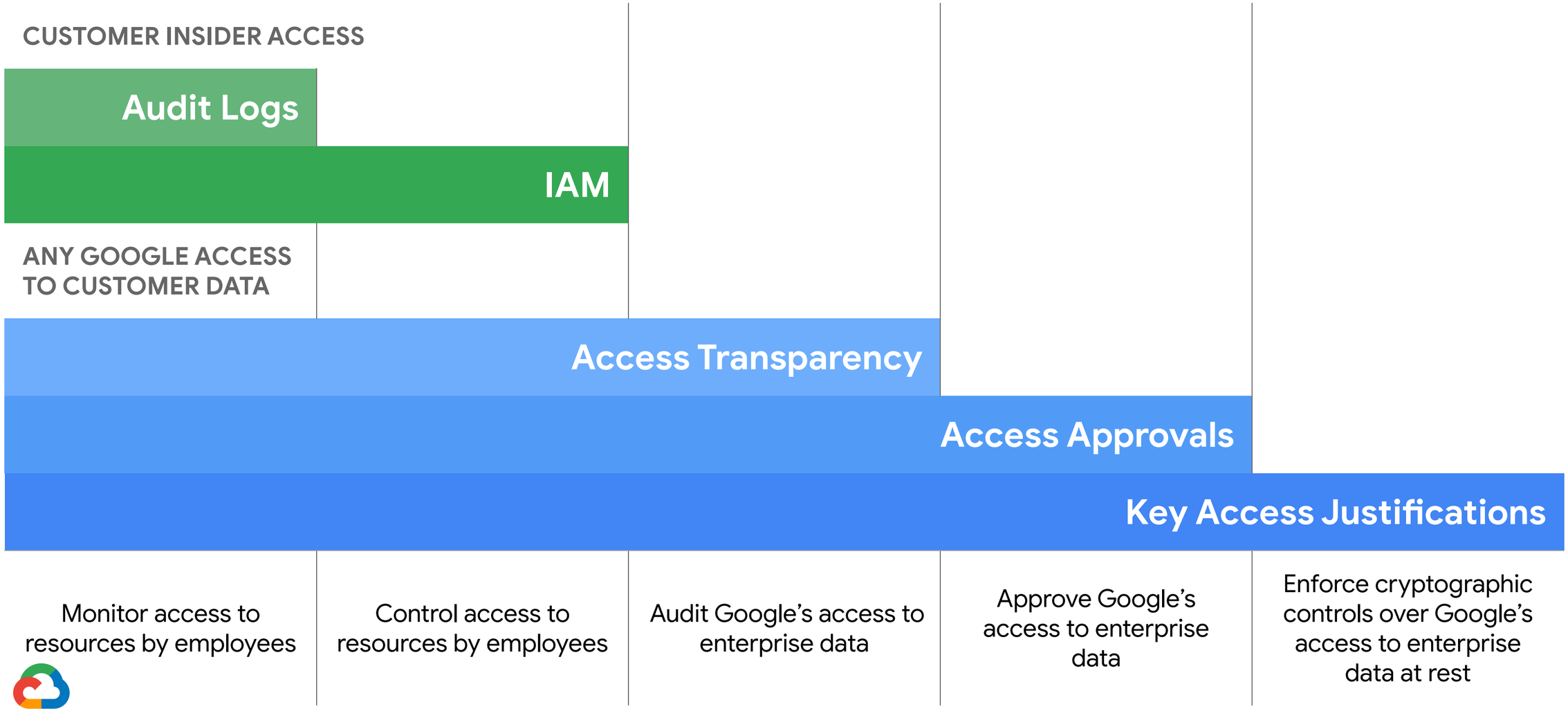


Trust through Access Transparency

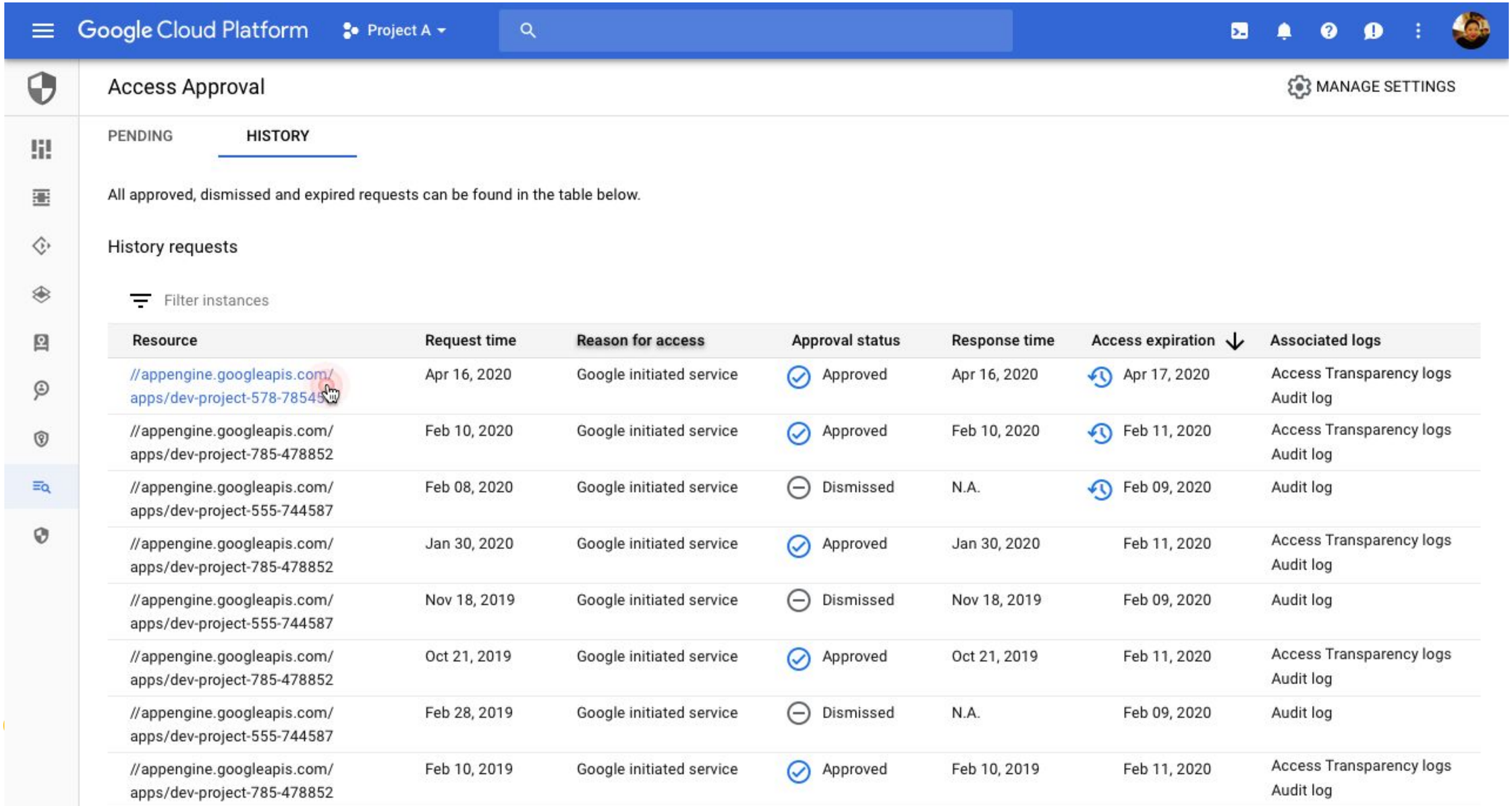
- Google’a Access Transparency provides near-real-time oversight over data access by either Google support or engineering.

Access Transparency and Control

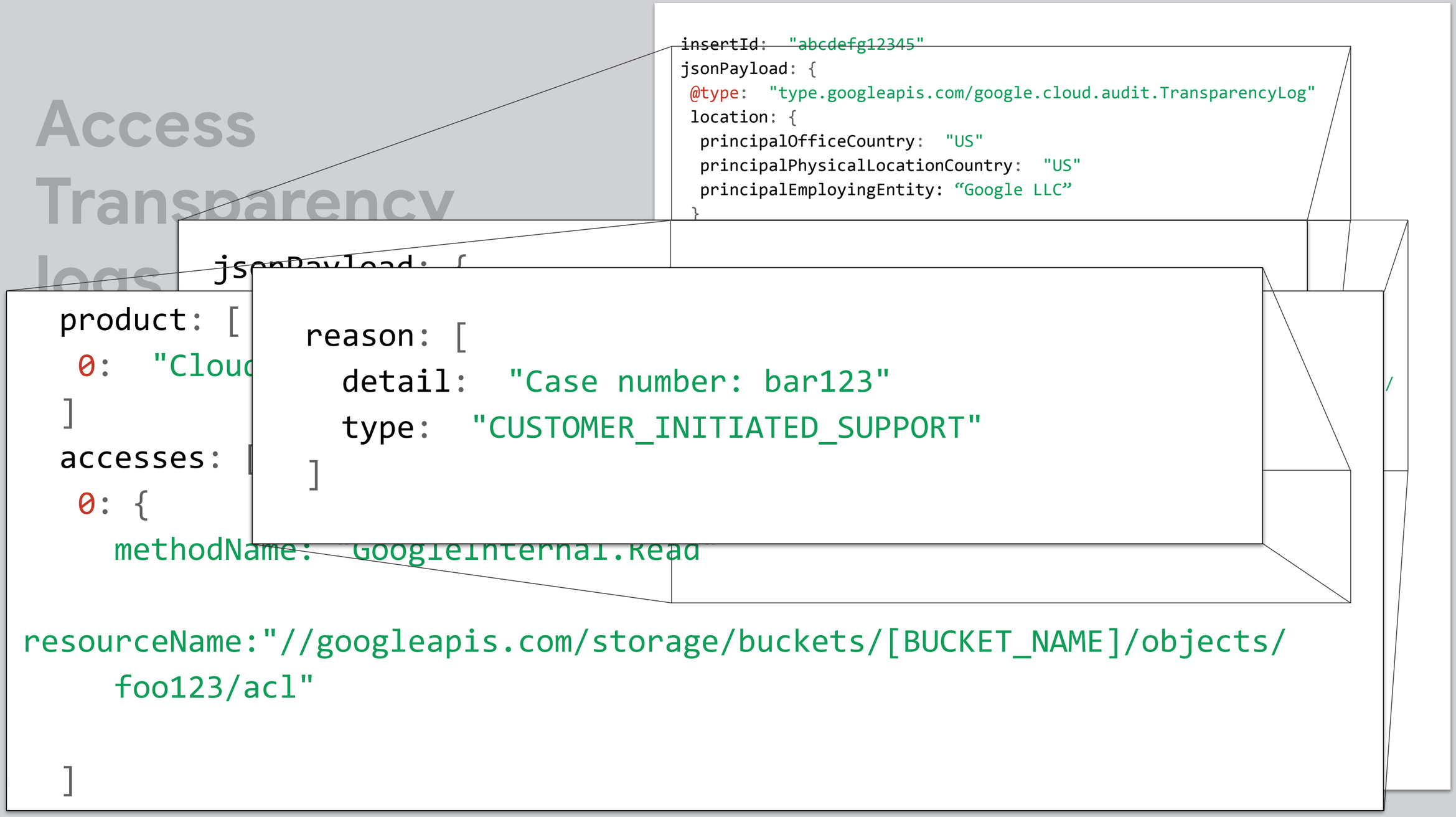
Trust through Access Transparency



History of approval requests



Access Transparency logs



Compliance Reports Manager

Google Cloud's industry-leading security, third-party audits and certifications, documentation, and contract commitments help support your compliance. Compliance reports manager provides you with easy, on-demand access to these critical compliance resources, at no additional cost. Key resources include our latest ISO/IEC certificates, SOC reports, and self assessments. Select resources may require sign-in with your Google Cloud or G Suite account. If you would like to access previous reports please reach out to support for more information.

Filter By: Industry Region Report Type Product Area

Select reports to download

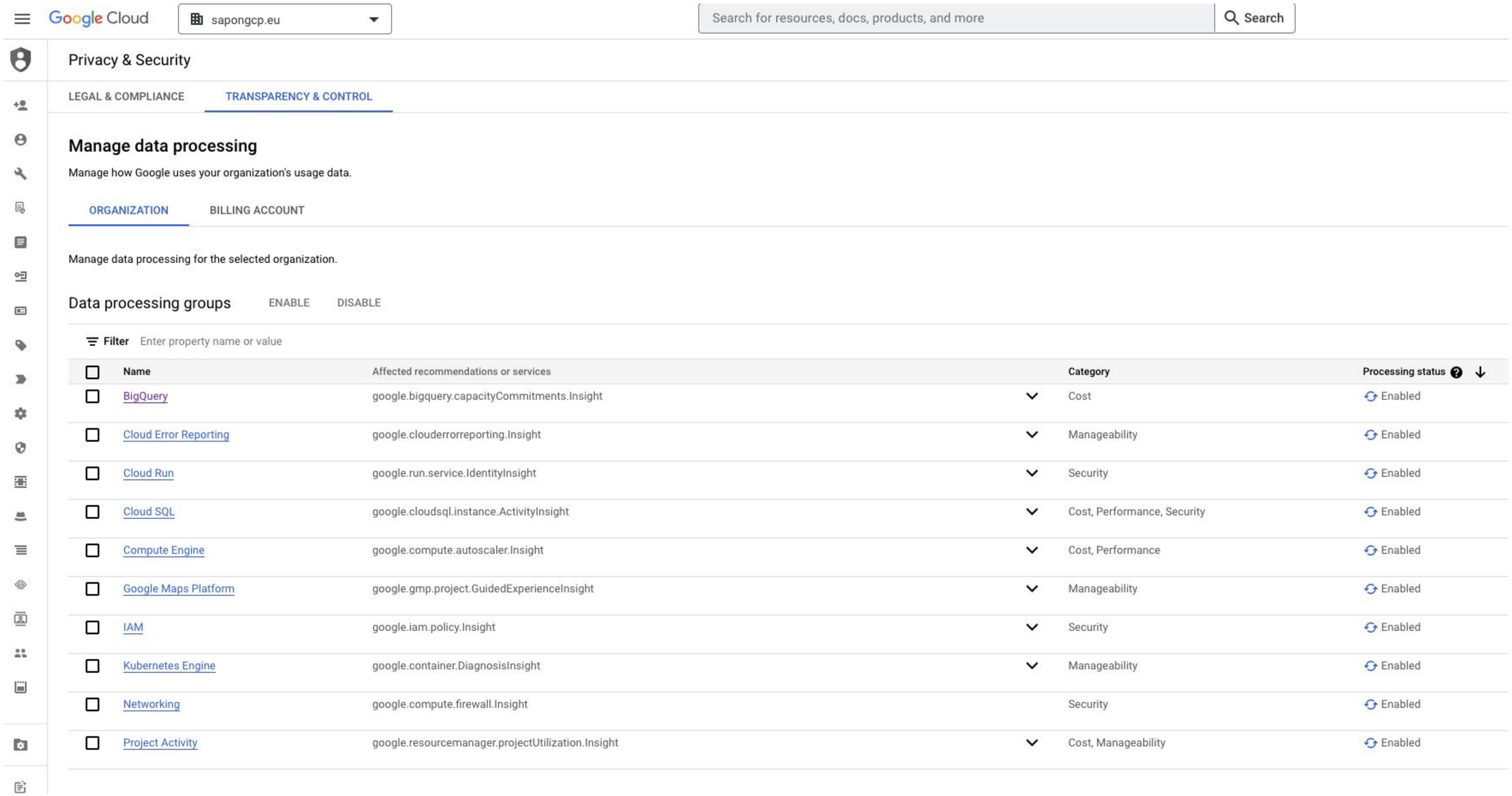
Download

Search for compliance reports in the table

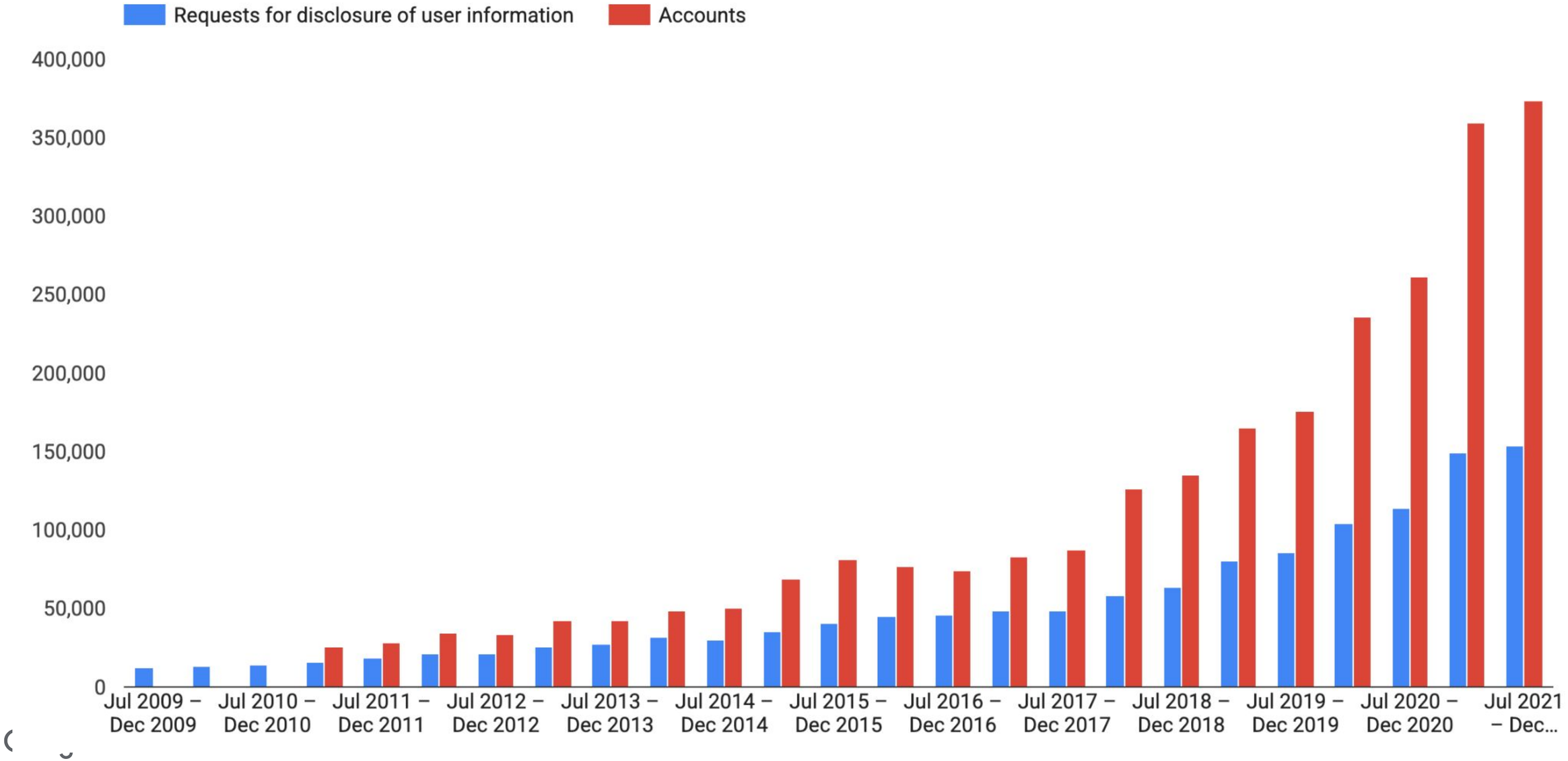
Downloadable reports only

Compliance	Report type	Product area	Last audit
ISO/IEC 27018:2019 ISO/IEC 27018 focuses on privacy and security	Certificate	G Suite	Apr 17, 2020

Transparency & Control



Google Transparency Reports



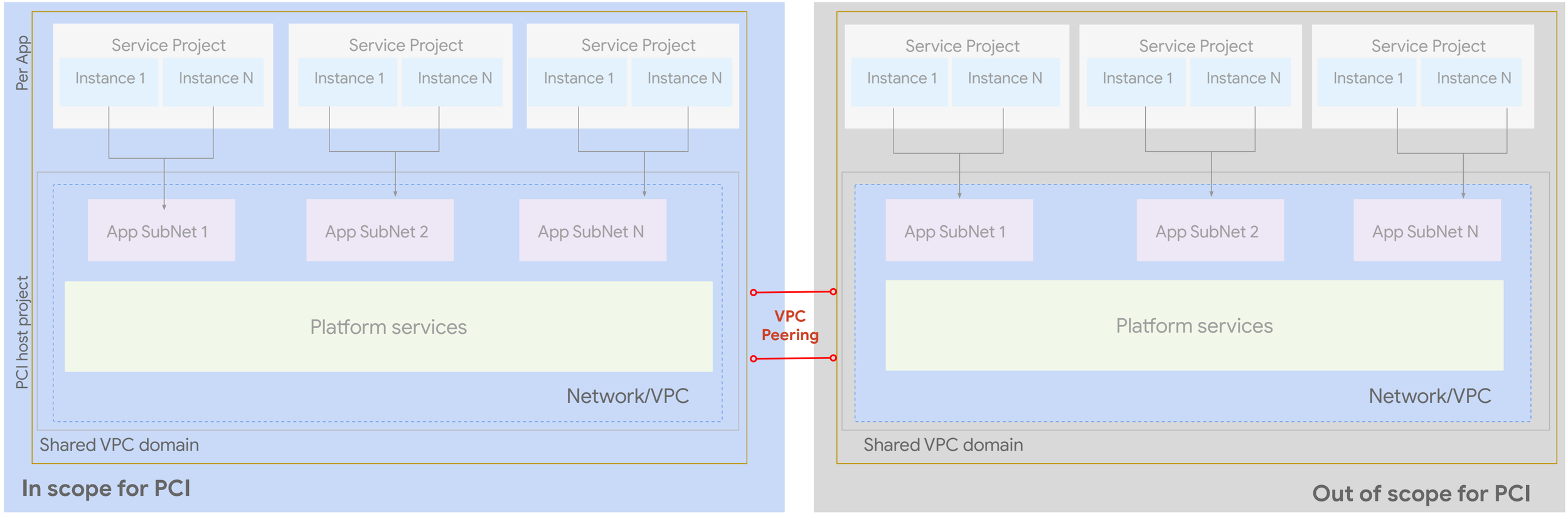
PCI DSS examples on GCP

Requirement 1

Install and maintain a firewall configuration to protect cardholder data

Requirement 1

Install and maintain a firewall configuration to protect cardholder data



Architecture - Using Shared VPC, host, and service projects to reduce scope of PCI environment through segmentation of networks. VPC network peering makes services available across VPC networks in private RFC 1918 space using Firewall access control lists.

Requirement 2 | Do not use vendor-supplied defaults

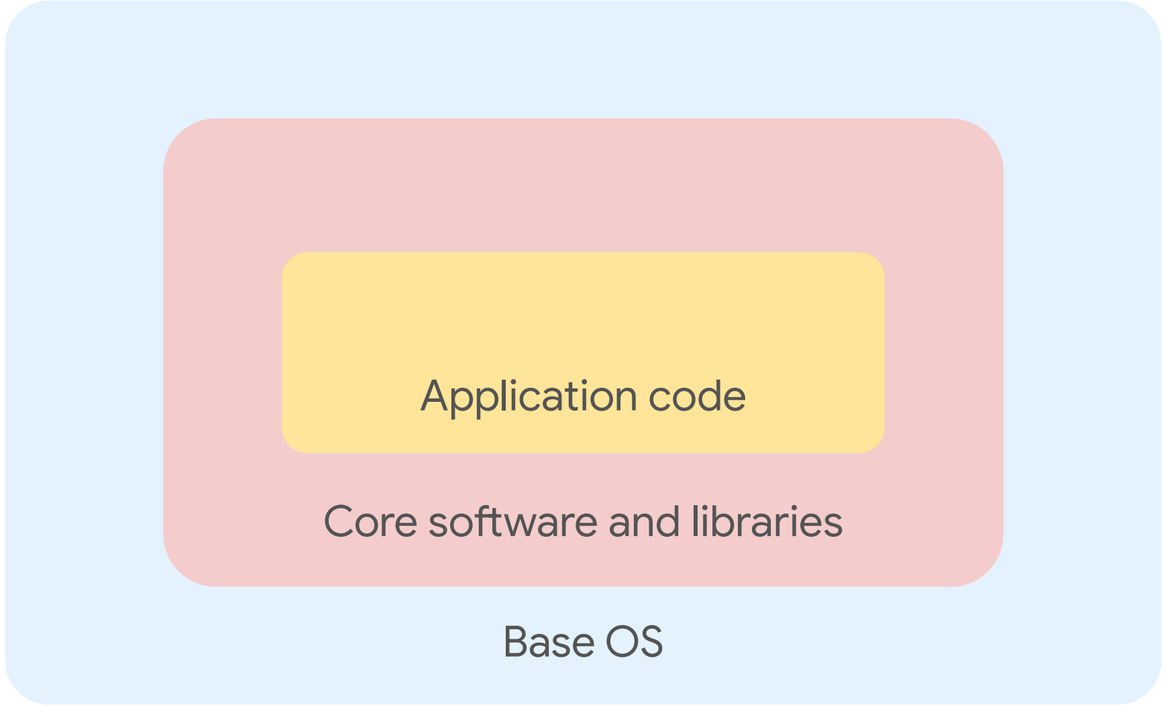
Requirement 2 | Do not use vendor-supplied defaults

Image baking

Base image - OS or hardened image from CIS with unnecessary packages removed

Core - packages and libraries needed for all instances (security, monitoring, language specific packages)

Application - application code



Requirement 3 | Protect stored cardholder data

Requirement 3 | Protect stored cardholder data

More Simple

Enjoy world class encryption without further need for configurations
By default

Encryption by default (only in GCP)

Keep keys in the cloud, for direct use by cloud services
Generally available

Cloud key management service

Keep keys on-premises, and use them to encrypt your cloud services
Available for Cloud Storage and Compute Engine

Customer-supplied encryption keys

More control

Requirement 3 | Protect stored cardholder data (cont.)

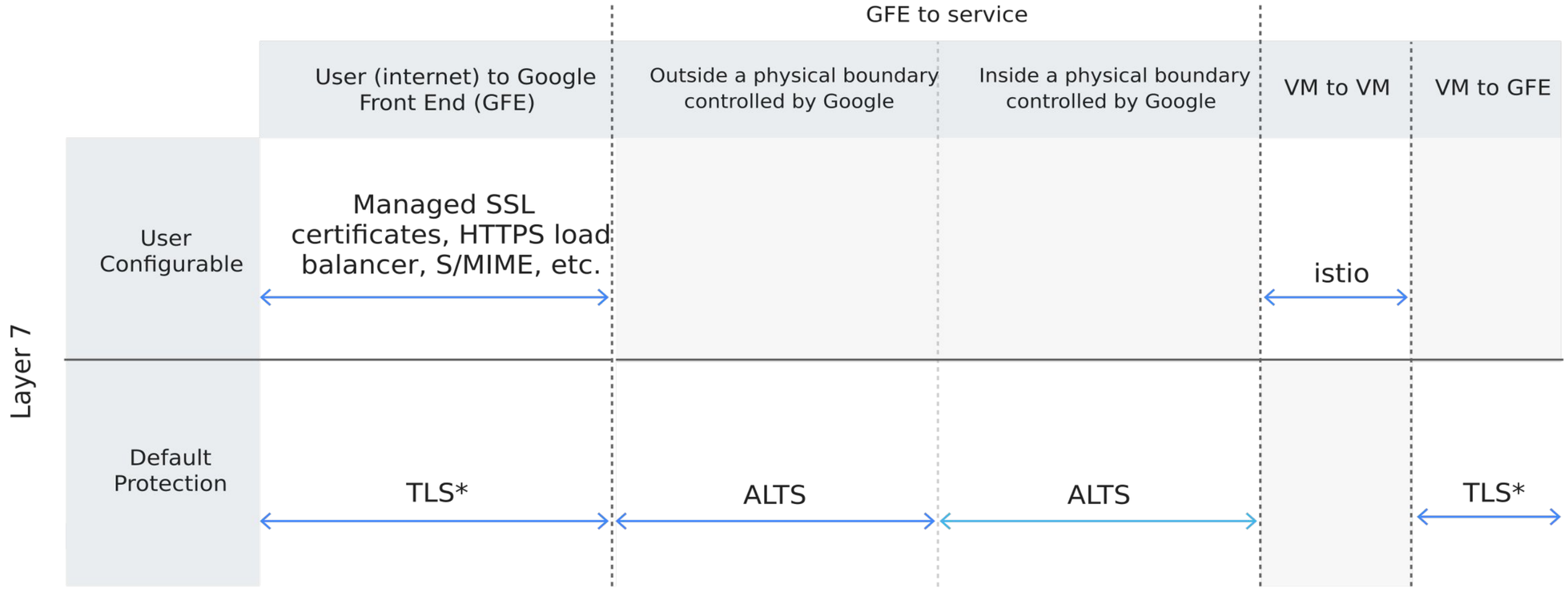
Data Loss Prevention API can be used to sanitize PCI data

Requirement 4

Encrypt transmission of cardholder data across open, public networks

Requirement 4

Encrypt transmission of cardholder data across open, public networks



→ Authentication only → Authentication and integrity → Authentication and integrity and encryption

* TLS is by default for Google Cloud services. For a customer application hosted on Google Cloud, this is something that needs to be configured by the customer.

Requirement 5

Protect all systems against malware and regularly update anti-virus software or programs

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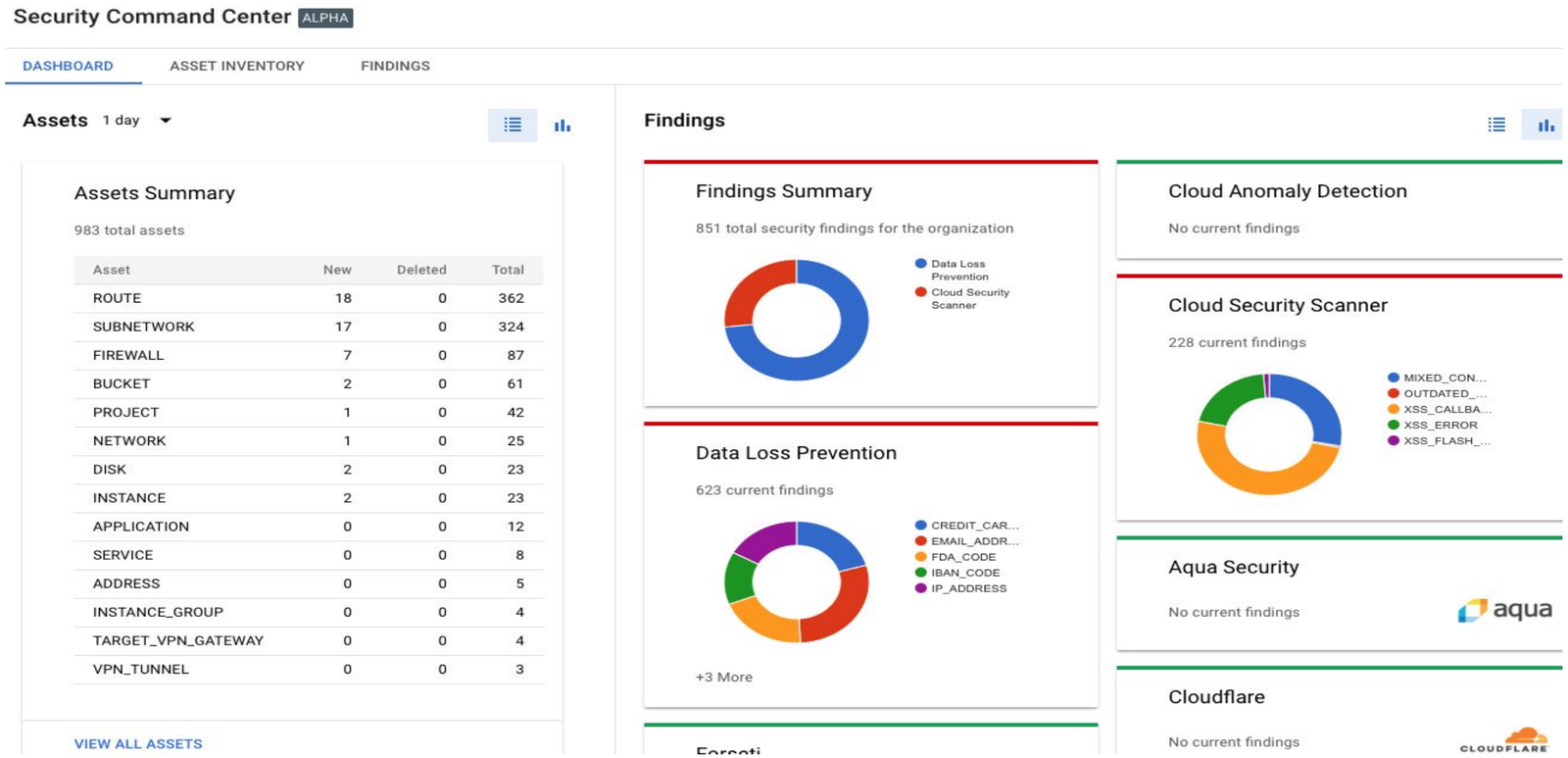
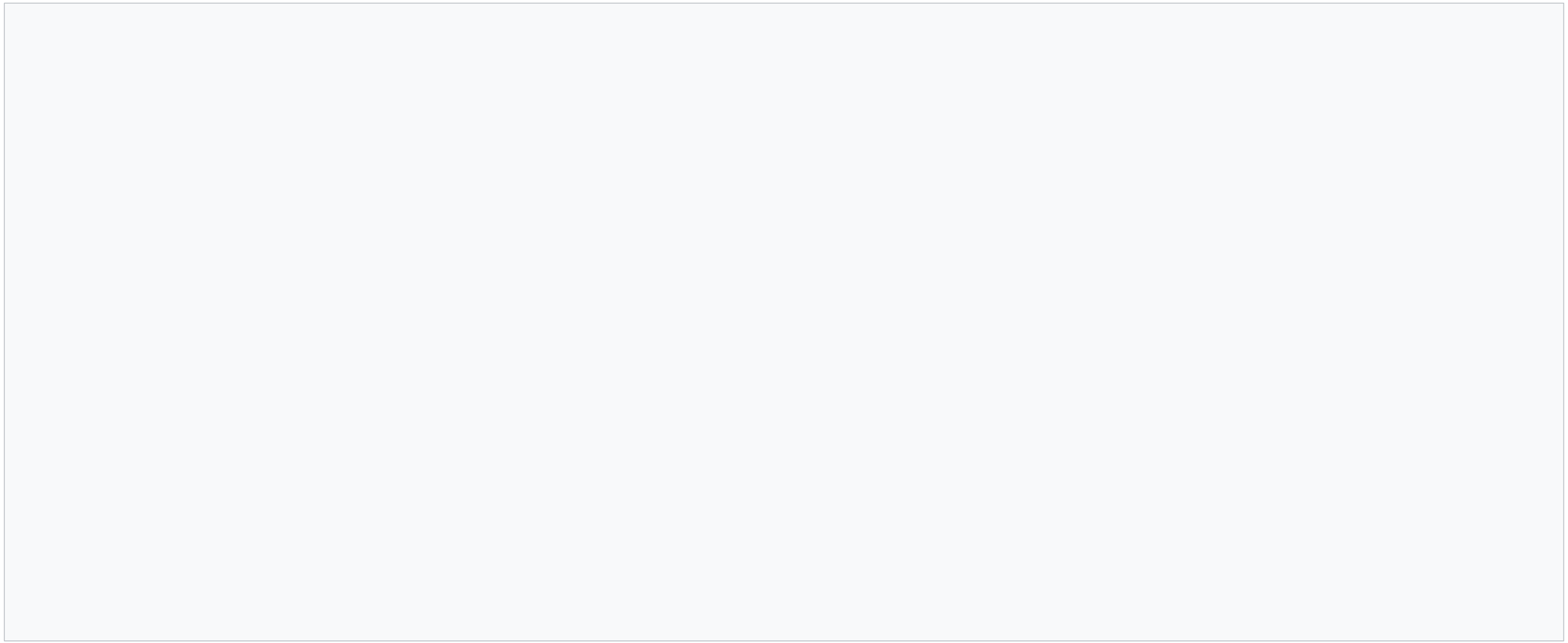
Protect all systems against malware and regularly update anti-virus software or programs



Cloud Security Command Center can help gather security information, identify threats, and take action.

Requirement 6 | Develop and maintain secure systems and applications



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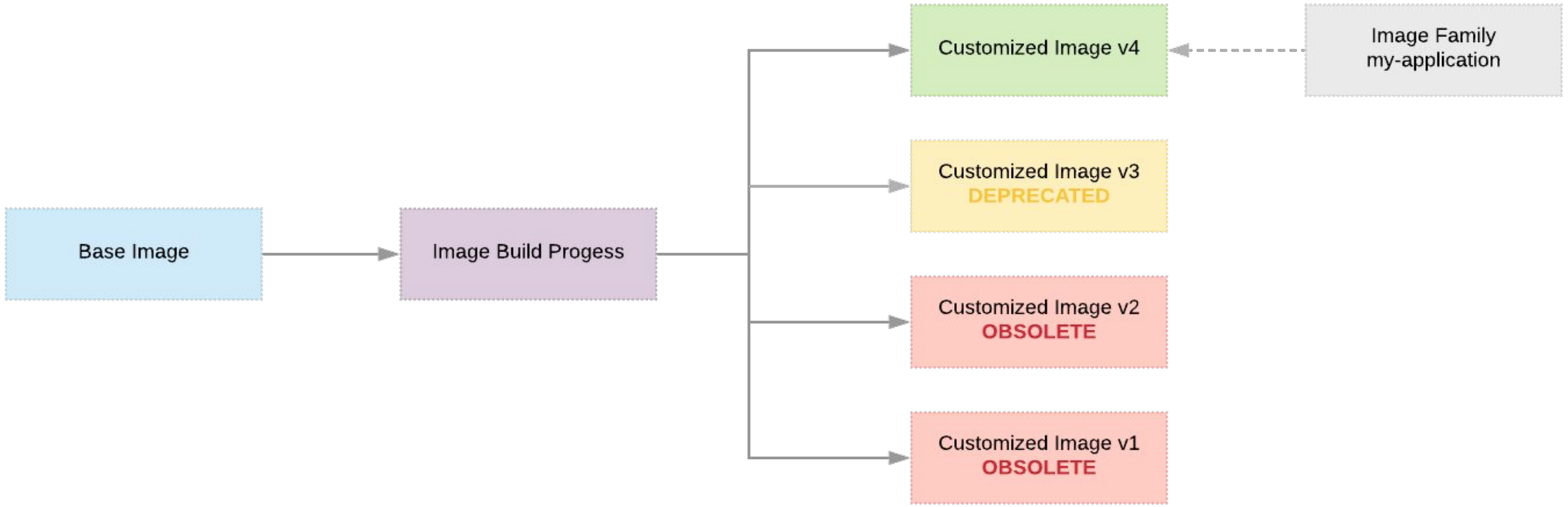


Deprecate old images so they are not used inadvertently.

[OS Image families best practices]

Requirement 7

Restrict access to cardholder data by business need to know

Requirement 7 | Restrict access to cardholder data by business need to know

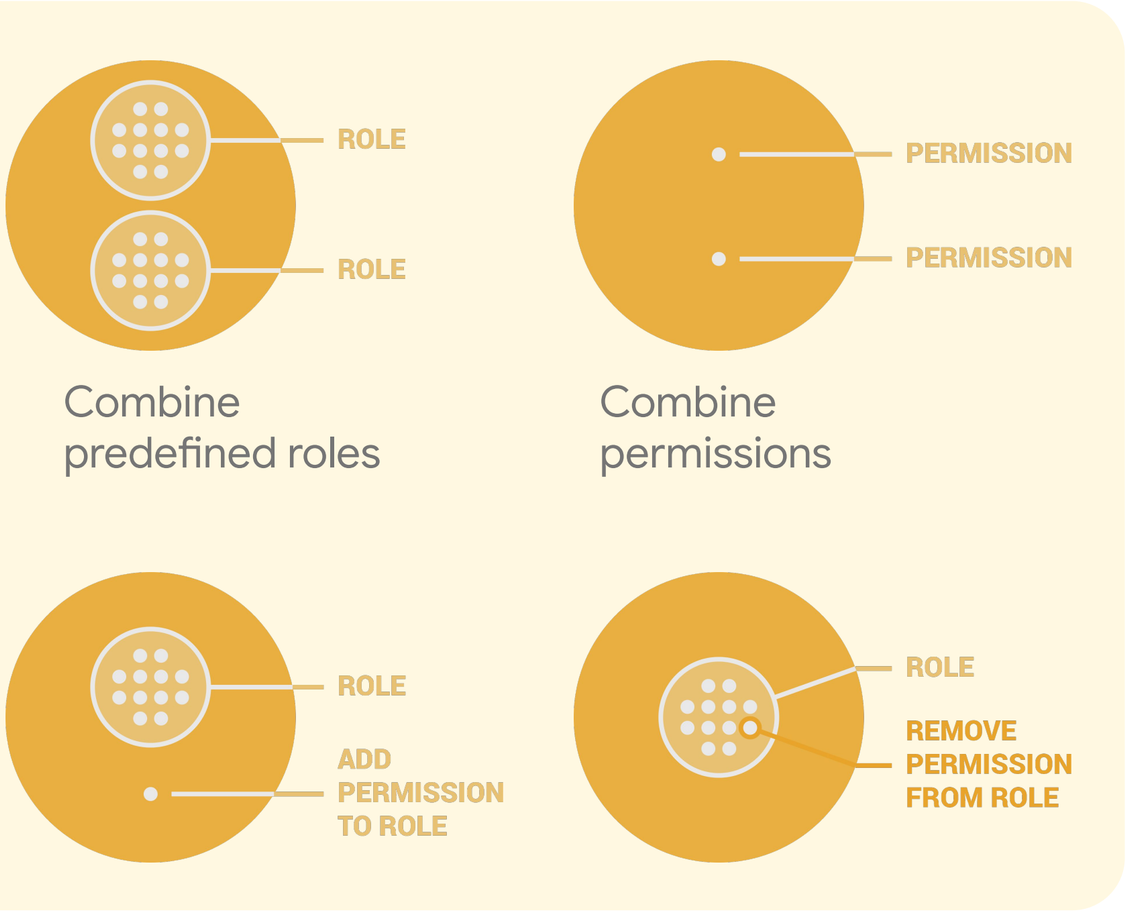
Once access needs for each job function are defined, **custom roles** can be created provide granular control over the exact permissions to access system components and data resources

- Create groups based on job functions, and assign custom roles to those groups.
- Job function groups can be nested in job classification groups.
- Custom roles can be defined at the organizational level

Review available permissions and their purpose through the API Explorer (search for product)

Services > App Engine Admin API v1

appengine.apps.authorizedCertificates.create	Uploads the specified SSL certificate.
appengine.apps.authorizedCertificates.delete	Deletes the specified SSL certificate.
appengine.apps.authorizedCertificates.get	Gets the specified SSL certificate.
appengine.apps.authorizedCertificates.list	Lists all SSL certificates the user is authorized to administer.



Requirement 8

Track and monitor all access to network resources and cardholder data

Requirement 8

Track and monitor all access to network resources and cardholder data

Admin console logs

- Admin console audits
- User audits
- Separate API and UI
- Export to BigQuery

Cloud audit logs

- Admin activity logs (always enabled)
- Data access logs (disabled by default)

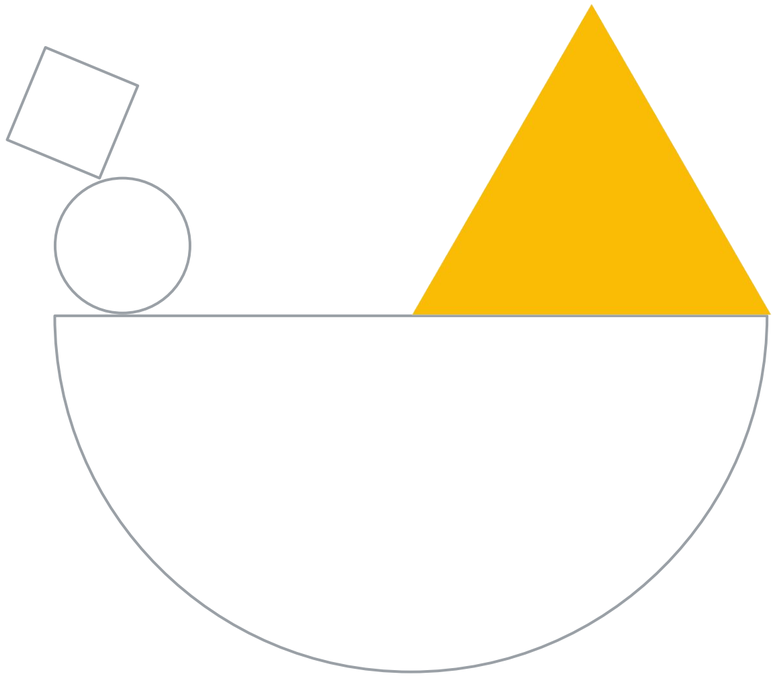
Stackdriver logging agent

- FluentD agent
- Common third-party applications
- System software

Network logs

- VPC flow
- CDN (Alpha)
- HTTP(S) load balancing (Alpha)
- Firewall rules logging

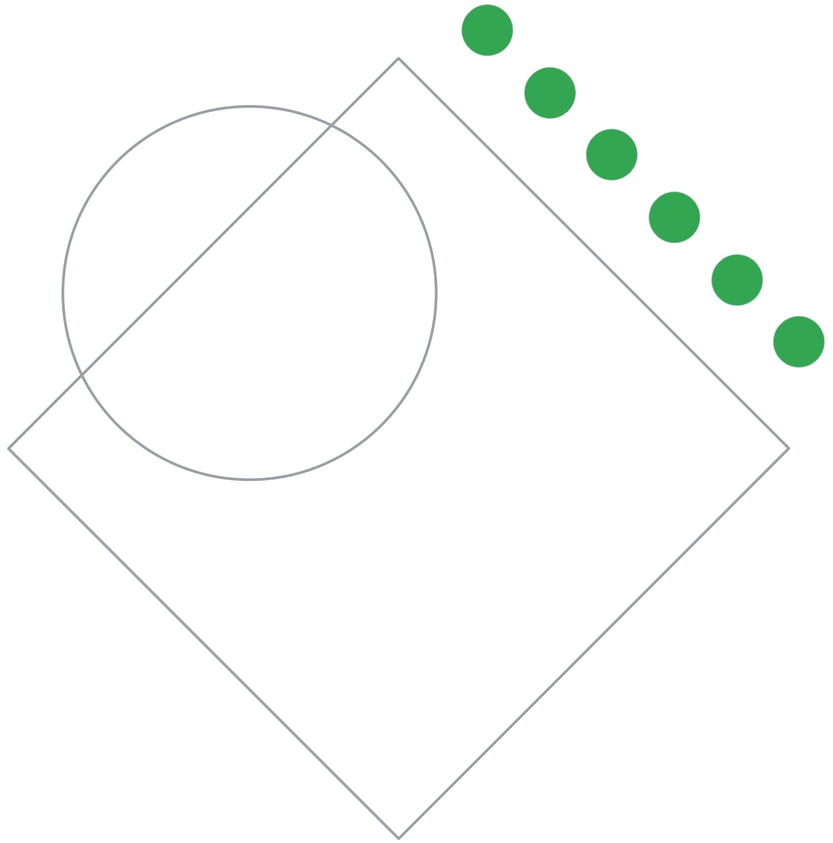
Diagnostic questions



Please complete the diagnostic questions now

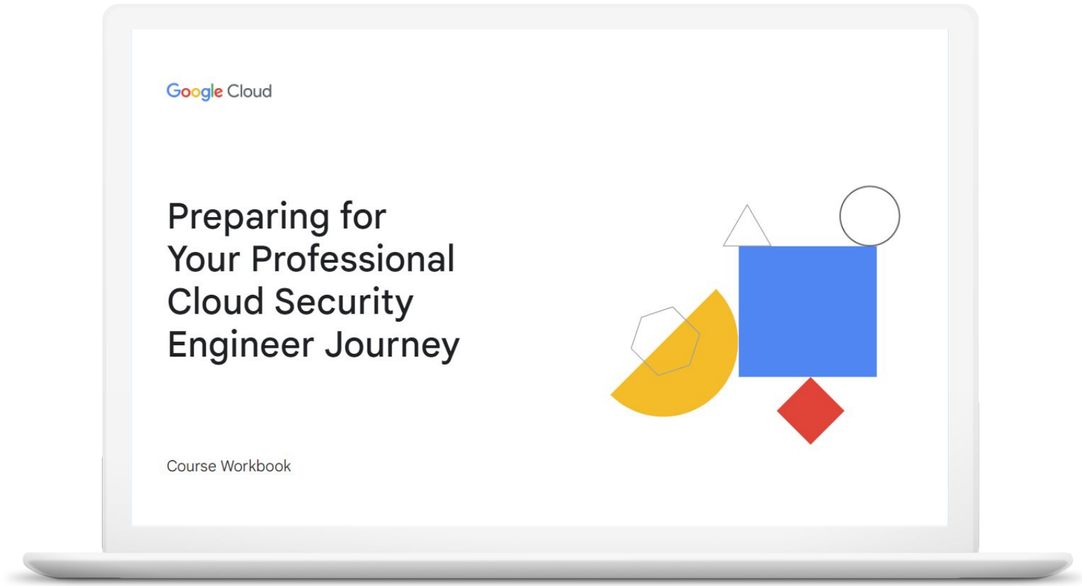
- Forms are provided for you to answer the diagnostic questions
- The instructor will provide you a link to the forms
- The diagnostic questions are also available in the workbook

Review and study planning



Your study plan:

Ensuring compliance



5.1 | Determining regulatory requirements for the cloud

5.1 Determining regulatory requirements for the cloud

Considerations include:

- Determining concerns relative to compute, data, and network.
- Evaluating security shared responsibility model
- Configuring security controls within cloud environments
- Limiting compute and data for regulatory compliance
- Determining the Google Cloud environment in scope for regulatory compliance

5.1 Diagnostic Question 01 Discussion

Cymbal Bank's lending department stores sensitive information, such as your customers' credit history, address and phone number, in parquet files. You need to upload this personally identifiable information (PII) to Cloud Storage so that it's secure and compliant with ISO 27018.

How should you protect this sensitive information using Cymbal Bank's encryption keys and using the least amount of computational resources?

A. Generate an AES-256 key as a 32-byte bytestring. Decode it as a base-64 string. Upload the blob to the bucket using this key.

B. Generate an RSA key as a 32-byte bytestring. Decode it as a base-64 string. Upload the blob to the bucket using this key.

C. Generate a customer-managed encryption key (CMEK) using RSA or AES256 encryption. Decode it as a base-64 string. Upload the blob to the bucket using this key.

D. Generate a customer-managed encryption key (CMEK) using Cloud KMS. Decode it as a base-64 string. Upload the blob to the bucket using this key.

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C. Generate a customer-managed encryption key (CMEK) using RSA or AES256 encryption. Decode it as a base-64 string. Upload the blob to the bucket using this key.

D. Generate a customer-managed encryption key (CMEK) using Cloud KMS. Decode it as a base-64 string. Upload the blob to the bucket using this key.

5.1 Diagnostic Question 02 Discussion

You are designing a web application for Cymbal Bank so that customers who have credit card issues can contact dedicated support agents. Customers may enter their complete credit card number when chatting with or emailing support agents. You want to ensure compliance with PCI-DSS and prevent support agents from viewing this information in the most cost-effective way.

What should you do?

A. Use customer-supplied encryption keys (CSEK) and Cloud Key Management Service (KMS) to detect and encrypt sensitive information.

B. Detect sensitive information with Cloud Natural Language API.

C. Use customer-managed encryption keys (CMEK) and Cloud Key Management Service (KMS) to detect and encrypt sensitive information.

D. Implement Cloud Data Loss Prevention using its REST API.

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D. Implement Cloud Data Loss Prevention using its REST API.

5.1 Diagnostic Question 03 Discussion

Cymbal Bank wants to launch a new website for their customers to enter their personal details and calculate their credit scores. The data will be stored in BigQuery tables and Cloud Storage buckets following GDPR compliance and data expiry rules. Cymbal Bank will also engage external analysts to build customized reports on BigQuery and Cloud Storage buckets. The external analysts must be able to run commands such as gsutil and bq from their command-line interfaces (CLIs), but they should not be able to copy the tables to any public storage.

How should you provide this access without violating the GDPR compliance?

A. Create the BigQuery dataset and Cloud Storage bucket in Europe. Change the project that contains BigQuery data to a new VPC with configured access to BigQuery and Cloud Storage. Add the external analysts to another Project. Use Shared VPC to share the configured Project with the external analyst's Project. Use Identity Access Management (IAM) to provide the Editor role to the external analysts.

B. Create a multi-region BigQuery dataset and dual-region Cloud Storage for high availability. Implement Identity and Access Management (IAM) controls on a service account with bigquery.rowAccessPolicies.getFilteredData permissions. Configure a Compute Engine instance to use this service account. Provide external analysts with access to this Compute Engine instance.

C. Create a multi-region BigQuery dataset and dual-region Cloud Storage for high availability. Implement Identity and Access Management (IAM) controls on a Compute Engine instance and provide all bigquery.datasets.* permissions. Create a Google group and provide access to the Compute Engine instance. Add all the external analysts to this group.

D. Create the BigQuery dataset and Cloud Storage bucket in Europe. Implement VPC Service Controls. Define the service perimeter to include a Cloud Storage bucket, BigQuery tables, and a Compute Engine instance. Configure the Compute Engine instance to connect to BigQuery and Cloud Storage. Provide external analysts with SSH access to the Compute Engine instance.

5.1 Diagnostic Question 03 Discussion

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How should you provide this access without violating the GDPR compliance?

A. Create the BigQuery dataset and Cloud Storage bucket in Europe. Change the project that contains BigQuery data to a new VPC with configured access to BigQuery and Cloud Storage. Add the external analysts to another Project. Use Shared VPC to share the configured Project with the external analyst's Project. Use Identity Access Management (IAM) to provide the Editor role to the external analysts.

B. Create a multi-region BigQuery dataset and dual-region Cloud Storage for high availability. Implement Identity and Access Management (IAM) controls on a service account with bigquery.rowAccessPolicies.getFilteredData permissions. Configure a Compute Engine instance to use this service account. Provide external analysts with access to this Compute Engine instance.

C. Create a multi-region BigQuery dataset and dual-region Cloud Storage for high availability. Implement Identity and Access Management (IAM) controls on a Compute Engine instance and provide all bigquery.datasets.* permissions. Create a Google group and provide access to the Compute Engine instance. Add all the external analysts to this group.

D. Create the BigQuery dataset and Cloud Storage bucket in Europe. Implement VPC Service Controls. Define the service perimeter to include a Cloud Storage bucket, BigQuery tables, and a Compute Engine instance. Configure the Compute Engine instance to connect to BigQuery and Cloud Storage. Provide external analysts with SSH access to the Compute Engine instance.

5.1 Diagnostic Question 04 Discussion

Cymbal Bank's Insurance Analyst needs to collect and store anonymous protected health information of patients from various hospitals. The information is currently stored in Cloud Storage, where each hospital has a folder that contains its own bucket. You have been tasked with collecting and storing the healthcare data from these buckets into Cymbal Bank's Cloud Storage bucket while maintaining HIPAA compliance.

What should you do?

A. Create a new folder. Create a new Cloud Storage bucket in this folder. Give the Insurance Analyst the 'Editor' role on the new folder. Collect all hospital data in this bucket. Use the Google Cloud Healthcare Data Protection Toolkit to monitor this bucket.

B. Create a new Project. Create a new Cloud Storage bucket in this Project with customer-supplied encryption keys (CSEK). Give the Insurance Analyst the 'Reader' role on the Project that contains the Cloud Storage bucket. Use the Cloud DLP API to find and mask personally identifiable information (PII) data to comply with HIPAA.

C. Create a new Project. Use the Google Cloud Healthcare Data Protection Toolkit to set up a collection bucket, monitoring alerts, audit log sinks, and Forseti monitoring resources. Use Dataflow to read the data from source buckets and write to the new collection buckets. Give the Insurance Analyst the 'Editor' role on the collection bucket.

D. Use the Cloud Healthcare API to read the data from the hospital buckets and use de-identification to redact the sensitive information. Use Dataflow to ingest the Cloud Healthcare API feed and write data in a new Project that contains the Cloud Storage bucket. Give the Insurance Analyst the 'Editor' role on this Project.

5.1 Diagnostic Question 04 Discussion

Cymbal Bank's Insurance Analyst needs to collect and store anonymous protected health information of patients from various hospitals. The information is currently stored in Cloud Storage, where each hospital has a folder that contains its own bucket. You have been tasked with collecting and storing the healthcare data from these buckets into Cymbal Bank's Cloud Storage bucket while maintaining HIPAA compliance.

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5.1 Diagnostic Question 05 Discussion

Cymbal Bank plans to launch a new public website where customers can pay their equated monthly installments (EMI) using credit cards. You need to build a secure payment processing solution using Google Cloud which should follow the PCI-DSS isolation requirements. How would you architect a secure payment processing environment with Google Cloud services to follow PCI-DSS?

Select the two correct choices

A. Create a new Google Cloud account with restricted access (separate from production environment) for the payment processing solution. Create a new Compute Engine instance and configure firewall rules, a VPN tunnel, and an internal load balancer.

B. Create a new Google Cloud account with restricted access (separate from production environment) for the payment processing solution. Configure firewall rules, a VPN tunnel, and an SSL proxy load balancer for a new App Engine flexible environment.

C. Create a new Google Cloud account with restricted access (separate from production environment) for the payment processing solution. Configure firewall rules, a VPN tunnel, and an HTTP(S) load balancer for a new Compute Engine instance.

D. Deploy an Ubuntu Compute Engine instance. Install the libraries needed for payment solutions and encryption/decryption. Deploy using Cloud Deployment Manager.

E. Deploy a Linux base image from preconfigured operating system images. Install only the libraries you need. Deploy using Cloud Deployment Manager.

5.1 Diagnostic Question 05 Discussion

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E. Deploy a Linux base image from preconfigured operating system images. Install only the libraries you need. Deploy using Cloud Deployment Manager.

5.1 Ensuring compliance

Documentation

Upload an object by using CSEK | Cloud Storage

Customer-managed encryption keys (CMEK) | Cloud KMS Documentation

Customer-supplied encryption keys | Cloud Storage

Data encryption options | Cloud Storage

ISO/IEC 27018 Certified Compliant | Google Cloud

Automating the Classification of Data Uploaded to Cloud Storage | Cloud Architecture Center | Google Cloud

Cloud DLP client libraries | Data Loss Prevention Documentation

Data Loss Prevention Demo

Overview of VPC Service Controls | Google Cloud

Getting to know the Google Cloud Healthcare API: Part 1

Sharing and collaboration | Cloud Storage

Google Cloud Platform HIPAA overview guide

Setting up a HIPAA-aligned project | Cloud Architecture Center

PCI Data Security Standard compliance | Cloud Architecture Center

Knowledge Check 1

Cymbal Bank has a compliance requirement to have control over key lifecycle and rotation periods. Which Google Cloud feature can they leverage to satisfy that requirement?

A. VPC service controls

B. CMEK with Cloud KMS

C. Audit logs

D. PCI-DSS compliance

Knowledge Check 1

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A. VPC service controls

B. CMEK with Cloud KMS

C. Audit logs

D. PCI-DSS compliance

Knowledge Check 2

Cymbal Bank has compliance requirements to ensure certain data is stored, processed, and never transferred or used outside of Europe. Which Google Cloud feature can help them achieve this?

A. VPC service controls

B. Organization policy constraints

C. Audit logs

D. Cloud DLP

Knowledge Check 2

Cymbal Bank has compliance requirements to ensure certain data is stored, processed, and never transferred or used outside of Europe. Which Google Cloud feature can help them achieve this?

A. VPC service controls

B. Organization policy constraints

C. Audit logs

D. Cloud DLP

Additional content

QUIZ week 5

(the one we went through during the meeting)

Reminder:

- NOT as complex as questions on the exam
- Technical knowledge validation (No business context)

Additional content 1

[READING]

- Encryption in transit
- Compliance Resource Center
- PCI Data Security Standard compliance
- Data residency, operational transparency, and privacy for European customers on Google Cloud
- Getting started with Assured Workloads
- Assured Workloads - blog post
- Organization policy constraints for Cloud Load Balancing
- Exporting Cloud Logging: Compliance requirements
- NIST Cybersecurity Framework & Google Cloud
- how Google handles government requests to disclose enterprise customer data
  - In short: Google informs the government that it should request customer data directly from the organization in question. If Google receives a direct government data request regarding a customer account, Google reviews and evaluates each and every one of the requests for legal validity and appropriate scope, as well as for compliance with international human rights standards, our own policies, and applicable law.
  - More details can be found in the Transparency Report.

Additional content 2

[VIDEOS]

- Master security and compliance in the public cloud - with a nice explanation of the differences between security OF the cloud vs security IN the cloud.
- How can Assured Workloads help support my FedRAMP Moderate compliance efforts? - demo of how to set up Assured Workloads
- How do I use the Google Cloud Compliance Resource Center?
- Cloud Inventory
- Cloud Intrusion Detection System (IDS) which uses Packet Mirroring
- reCAPTCHA Enterprise which works with Cloud Armor
- Shielded VMs and Confidential Computing
- Hierarchical Firewall Policies
- Serverless VPC connector and Network restricted functions
- Security Command Center

[PODCASTS]

- Making Compliance Cloud-native
- Ransomware and cyber resilience

Make sure to...

Enjoy the journey as much as the destination!