Google Cloud BigQuery Threat Model

TRUSTONCLOUD

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Source
The latest version of this work is hosted on GitHub.

Contact
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The ThreatModel for GCP BigQuery allows you to simplify secure adoption and usage by defining all the controls you can consider as per the shared responsibility model. Use this document as your go-to guide for ensuring robust security in your BigQuery environments.

TrustOnCloud is excited to present the open-sourced ThreatModel for BigQuery. We've already open-sourced one for Azure and one for AWS and didn't want to make Google feel left out. This comprehensive document covers everything from threat scenarios to control activities, helping your security teams make informed, unbiased decisions. We also have this available via ControlCatalog, a friendly UI for our GCP, AWS and Azure in-depth ThreatModels. Click here to try now for yourself: **ControlCatalog**

How to Use the ThreatModel for GCP BigQuery

At TrustOnCloud we help customers consume our threat models in different ways:

- ControlCatalog (Interactive website)
- Human Readable Documents (PDF/DOCX)
- Machine Readable Documents (JSON)

Using **ControlCatalog:** To help our customers navigate the information in our ThreatModels, we have ControlCatalog, a reactive UI to navigate our ThreatModels. With ControlCatalog, we want to help anyone take advantage of the data from our ThreatModels. It allows the reader to pivot between threats and controls, set the MITRE ATT&CK®, see the top threats and controls, understand a particular flow, etc.

The ThreatModel is a detailed guide, packed with actionable insights and organized to address various use cases. Here's how you can make the most of it:

Reading our **document:** The document might feel overwhelming with its 76+ pages. All pages of the ThreatModel are relevant for at least one-use case; your use case might only need some of the pages

Reading the document:

Reading our document: The document might feel overwhelming with its 76+ pages. All pages of the ThreatModel are relevant for at least one-use case; your use case might only need some of the pages.

1. Covering the “best practices” (e.g., best security/effort ratio)

Where to look:

Refer to page 59 [Appendix 1 – Prioritized List for Control Implementation] for a ranking of controls based on their effectiveness.

What do you get out of it:

Review your controls, starting with the “Very High” priority (using the implementation column). Test your controls work (using the testing column). Feel free to skip controls not relevant to your usage of the service.

What to do:

Review your controls, starting with the “Very High” priority (using the implementation column). Test your controls work (using the testing column). Feel free to skip controls not relevant to your usage of the service.

Appendix 1 - Prioritized list for control implementation

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C2] Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Request the process and records of enabling and protecting VPC Service Controls for BigQuery and BigQuery-connected services, using the Compute ThreatModel.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6 Bigquery.FC7 Bigquery.FC8	Bigquery.T1 (High) Bigquery.T3 (High) Bigquery.T4 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T7 (High) Bigquery.T8 (High) Bigquery.T9 (High) Bigquery.T10 (High) Bigquery.T11 (High) Bigquery.T12 (High) Bigquery.T13 (High) Bigquery.T14 (High) Bigquery.T15 (High) Bigquery.T17 (High) Bigquery.T18 (High) Bigquery.T19 (High) Bigquery.T20 (High) Bigquery.T21 (High) Bigquery.T22 (High) Bigquery.T23 (High) Bigquery.T24 (High) Bigquery.T26 (High)	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C15, assured by Bigquery.C16] Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed.	Request 1) the mechanism ensuring no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", 2) its records of execution for all datasets, and 3) the plan to move any older datasets.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T9 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C16] Verify no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers" (e.g., using the Security Command Center finding PUBLIC_DATASET).	Modify a dataset to allow access to 1) "AllUsers", or 2) "AllAuthenticatedUsers"; it should be detected.	Very Low	Bigquery.FC1 Bigquery.FC2	-	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C1] Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	Request the list of authorized IAM members with the permissions required to launch the attack, its review process, and its review records.	High	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6	Bigquery.T1 (Very High) Bigquery.T2 (Very High) Bigquery.T3 (Very High) Bigquery.T4 (Very High) Bigquery.T5 (Very High) Bigquery.T6 (Very High)	High

Who for:

DevOps team and/or not-too-sensitive workloads (or what we like to call it, “if it gets owned, we will have a bad week, not a bad year”)

2. Reviewing the service based on your risk tolerance

Not every control will be relevant to every use case. The ThreatModel allows you to assess risks and implement controls tailored to your organization's specific needs

What do you get out of it:

We call feature classes the portion of the service you can enable (exposing you to risk on those APIs) while being able to disable the rest. You can go deeper with each feature class page with its Data Flow Diagram and associated threats and controls. This enables you to secure the parts of the service you are using without the need to waste cycles on securing parts of the services which aren't in use.

What to do:

Identify the feature classes you intend to use during a threat modeling session with the DevOps team. Review each threat (at least Medium and above) and its mitigating controls. Decide what controls (or mitigation impact levels) are required for each threat to satisfy your risk tolerance.

Where to look:

Refer to page 59 [Appendix 1 – Prioritized List for Control Implementation] for a ranking of controls based on their effectiveness.

Feature Classes

BigQuery has the following feature classes and subclasses (i.e. dependent on the usage of its class) that can be activated, restricted, or blocked using Google Cloud Identity and Access Management.

Feature	Relation	Description
Dataset and tables (FC1)	class	You can create a table inside a dataset. You can run SQL queries and jobs on datasets in a very fast way. Jobs are actions that BigQuery runs on your behalf to load data, export data, query data, or copy data.
User-Defined Functions (FC2)	subclass of Dataset and tables	A User-Defined Function (UDF) lets you create a function by using a SQL expression or JavaScript code.
BigQuery connections and BigQuery Omni (FC3)	subclass of Dataset and tables	To create a connection for federated queries when adding data from external data sources or exporting data to cross Cloud Storages.
BigQuery Data Transfer (FC4)	subclass of Dataset and tables	You can transfer external data from SaaS applications to Google BigQuery on a regular basis.
BigQuery reservation (FC5)	subclass of Dataset and tables	You can purchase dedicated query processing capacity.
BigQuery ML (FC6)	subclass of Dataset and tables	You can create and execute machine learning models in BigQuery using standard SQL queries.
Table snapshot (FC7)	subclass of Dataset and tables	A BigQuery table snapshot preserves the contents of a table (called the base table) at a particular time.
Data policy (FC8)	subclass of Dataset and tables	You can provide different levels of visibility to different groups of users by using policy tags.

Who for:

Security Architects and/or for sensitive workloads (typically having reputational risks or regulatory risks)

3. Technology onboarding for large enterprises/agencies

For organizations with complex data needs, the ThreatModel provides advanced configurations to ensure compliance and data integrity at scale.

Where to look in the ThreatModel:

Everywhere. Typically, there is a decision from the enterprise/agency to use the service or not. We usually walk our customers through the relevant sections with our Cloud Threat Researchers.

What do you get out of it:

A complete overview of the service, its features, threats, and controls.

What to do:

Review the whole document. Some customers decide not to use a service for their highest application criticality or take an exception-based approach. In other cases, services can proceed to internal steps like building infrastructure-as-code templates or configuring events in your CSPM.

Denial of Service/denial of wallet by removing/creating reservations

Threat Id	Bigquery.T12
Name	Denial of Service/denial of wallet by removing/creating reservations
Description	A slot is a dedicated vCPU that runs queries. Each slot is allocated to a reservation. An attacker can remove a reservation, failing any jobs that are currently executing with slots from that reservation or decreasing the performance for future jobs. An attacker can also create a reservation with unauthorized configurations or modify an existing reservation to achieve the same objective or incur cost.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Medium (4.8)
IAM Access	{ "OR": [{ "AND": ["bigquery.reservations.delete", "bigquery.reservationAssignments.delete"] }, { "AND": ["bigquery.reservationAssignments.create", { "OR": ["bigquery.reservations.create", "bigquery.reservations.update"] }] }] }

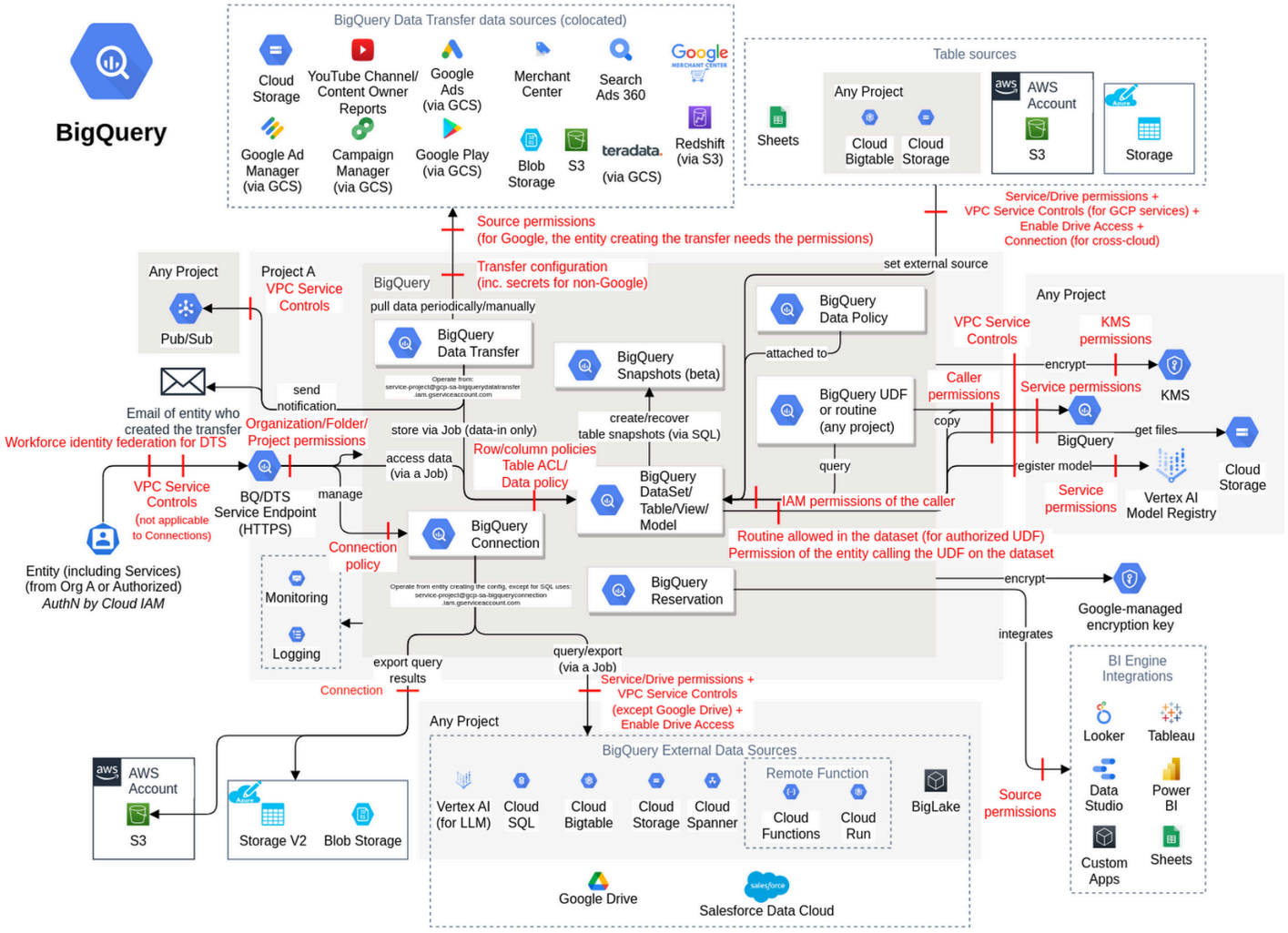
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Monitor BigQuery capacity and utilization Monitor slot consumption (e.g., using slot recommender), job concurrency, job execution time, job errors, and bytes processed across the entire organization (e.g., using BigQuery Admin Resource Charts). Monitor slot capacity (e.g., using slot estimator) to estimate the correct number of slots for the BigQuery workload.	Medium	-	-	2
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType). Ensure each reservation and its assignments use an authorized configuration.	Medium	2	-	2

Who for:

For organizations with complex data needs, the ThreatModel provides advanced configurations to ensure compliance and data integrity at scale.

BigQuery

Data Flow Diagram



Security Scorecard

Security in the Cloud	
Number of Actions*	141
Identity management	Cloud IAM
Number of IAM permissions*	95
Resource-based access	tables rows columns connections
VPC Service Controls	Yes
Network Filtering	No
Encryption-at-rest	Yes
Encryption-in-transit	Yes

* See details in Appendixes

Mitre ATT&CK matrix for BigQuery

Reconnaissance	Resource Development	Initial Access	Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Command and Control	Exfiltration	Impact
		Unauthorized access to data by changing connection configurations [Bigquery.T2]	Importing malicious models in BigQuery [Bigquery.T24]		Restricting access to datasets, tables, and connections by modification of privileges [Bigquery.T10]							Exfiltration of data by exporting tables to other services [Bigquery.T6]	Destruction of data by deleting dataset or table [Bigquery.T1]
					Unauthorized access to the table columns by adding or removing policy tags [Bigquery.T17]							Escalate privileges, loss of availability or integrity of data, or exfiltrate data via an unauthorized query on a dataset or a table [Bigquery.T9]	Loss of integrity and availability by copying datasets and overwriting the destination table(s) [Bigquery.T3]
					Misconfiguration of a dataset to cause loss of integrity and availability or privilege escalation by modification of access array of a dataset [Bigquery.T21]							Data exfiltration by updating the destination dataset in transfer and transfer credentials [Bigquery.T13]	Loss of the integrity of training model [Bigquery.T4]
												Data exfiltration by exporting query results [Bigquery.T15]	Loss of integrity and availability by appending, overwriting data, or creating a table [Bigquery.T5]
												Model exfiltration by registering BigQuery ML models with the Vertex AI Model Registry [Bigquery.T18]	DoS by throttling limit [Bigquery.T7]
												Table exfiltration by cloning [Bigquery.T19]	Loss of integrity and availability by manipulating data using UDFs [Bigquery.T8]
												Exfiltration of query results to an unauthorized destination table or execution of unauthorized UDFs [Bigquery.T20]	Disruption of application functionality by modification of table and views configurations [Bigquery.T11]
												BigQuery ML model exfiltration [Bigquery.T23]	Denial of Service/denial of wallet by removing/creating reservations [Bigquery.T12]

												Unauthorized data access via cache [Bigquery.T26]	Loss of data during recovery by deleting a snapshot [Bigquery.T14]
													Permanent loss of a BigQuery ML model by modifying its expiration time [Bigquery.T22]
													Misconfiguration of a table to cause loss of integrity and availability [Bigquery.T25]

Feature Classes

BigQuery has the following feature classes and subclasses (i.e. dependent on the usage of its class) that can be activated, restricted, or blocked using Google Cloud Identity and Access Management.

Feature	Relation	Description
Dataset and tables (FC1)	class	You can create a table inside a dataset. You can run SQL queries and jobs on datasets in a very fast way. Jobs are actions that BigQuery runs on your behalf to load data, export data, query data, or copy data.
User-Defined Functions (FC2)	subclass of Dataset and tables	A User-Defined Function (UDF) lets you create a function by using a SQL expression or JavaScript code.
BigQuery connections and BigQuery Omni (FC3)	subclass of Dataset and tables	To create a connection for federated queries when adding data from external data sources or exporting data to cross Cloud Storages.
BigQuery Data Transfer (FC4)	subclass of Dataset and tables	You can transfer external data from SaaS applications to Google BigQuery on a regular basis.
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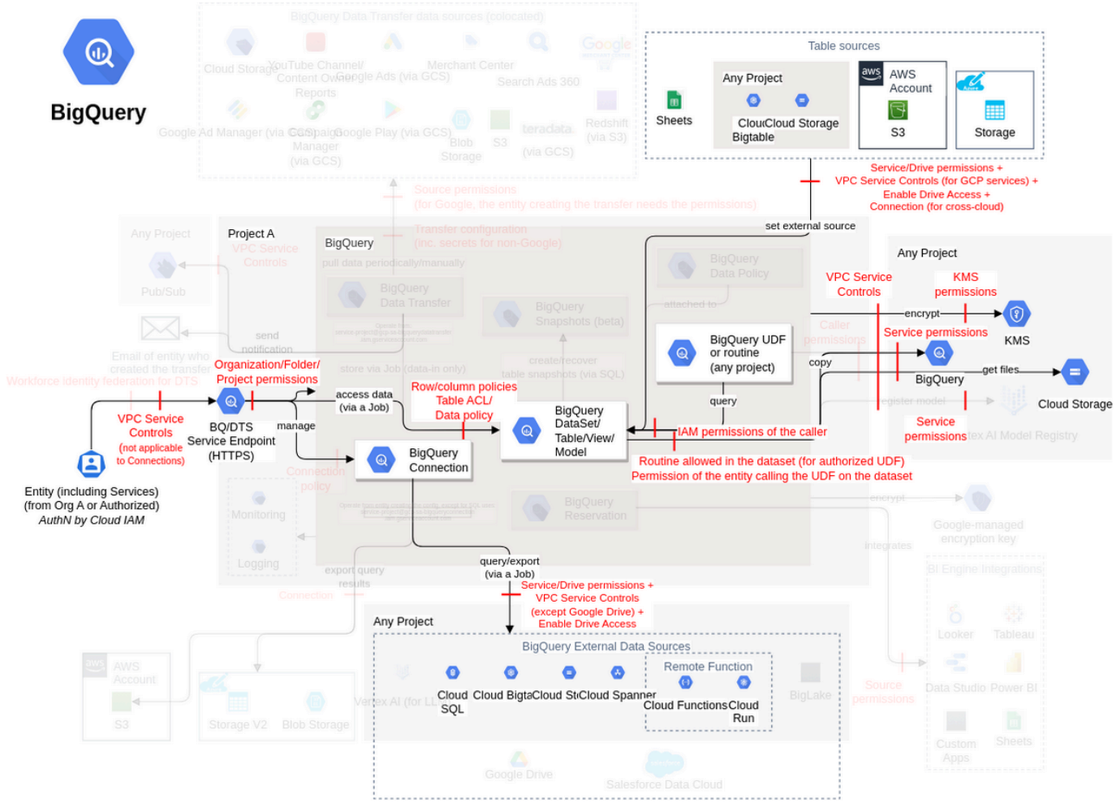
BigQuery ML (FC6)	subclass of Dataset and tables	You can create and execute machine learning models in BigQuery using standard SQL queries.
Table snapshot (FC7)	subclass of Dataset and tables	A BigQuery table snapshot preserves the contents of a table (called the base table) at a particular time.
Data policy (FC8)	subclass of Dataset and tables	You can provide different levels of visibility to different groups of users by using policy tags.

Dataset and tables *(class, FC1)*

You can create a table inside a dataset. You can run SQL queries and jobs on datasets in a very fast way. Jobs are actions that BigQuery runs on your behalf to load data, export data, query data, or copy data.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

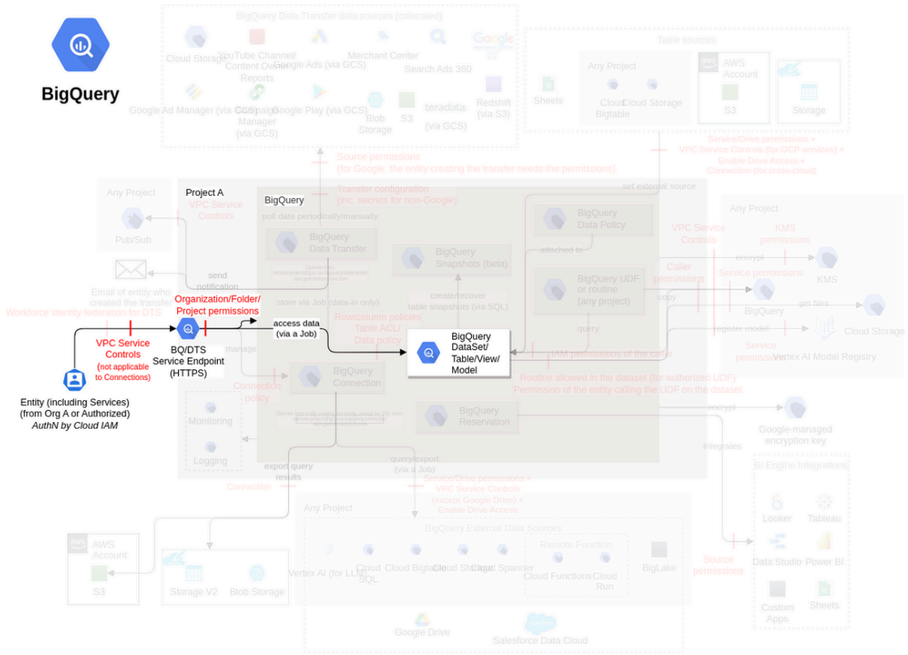
Action	IAM Permission
Creates a new empty dataset.	bigquery.datasets.create

Threat List

Name	CVSS
Escalate privileges, loss of availability or integrity of data, or exfiltrate data via an unauthorized query on a dataset or a table	High (8.8)
Loss of integrity and availability by copying datasets and overwriting the destination table(s)	Medium (5.7)
Misconfiguration of a dataset to cause loss of integrity and availability or privilege escalation by modification of access array of a dataset	Medium (5.7)
Misconfiguration of a table to cause loss of integrity and availability	Medium (5.7)
Loss of integrity and availability by appending, overwriting data, or creating a table	Medium (5.2)
Exfiltration of query results to an unauthorized destination table or execution of unauthorized UDFs	Medium (4.8)
Disruption of application functionality by modification of table and views configurations	Medium (4.8)
Restricting access to datasets, tables, and connections by modification of privileges	Medium (4.2)
Table exfiltration by cloning	Medium (4.2)
Exfiltration of data by exporting tables to other services	Medium (4.2)
Destruction of data by deleting dataset or table	Low (3.5)
Unauthorized data access via cache	Low (2.1)
DoS by throttling limit	Low (2.0)

Escalate privileges, loss of availability or integrity of data, or exfiltrate data via an unauthorized query on a dataset or a table

Threat Id	Bigquery.T9
Name	Escalate privileges, loss of availability or integrity of data, or exfiltrate data via an unauthorized query on a dataset or a table
Description	SQL queries are run on the data stored inside tables. An attacker can run a simple SQL query (e.g., "SELECT * FROM *TABLE_NAME*") to get all the data from a specific table. An attacker can also update or drop columns of a table, change the case sensitivity of datasets and its tables to escalate privileges while avoiding detection by a poorly designed access management system, set unauthorized default values of a column to corrupt or steal data, or update the metadata cache settings of object or BigLake tables to impact the query latency.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	High (8.8)
IAM Access	{ "AND": ["bigquery.jobs.create", "bigquery.tables.getData"] }

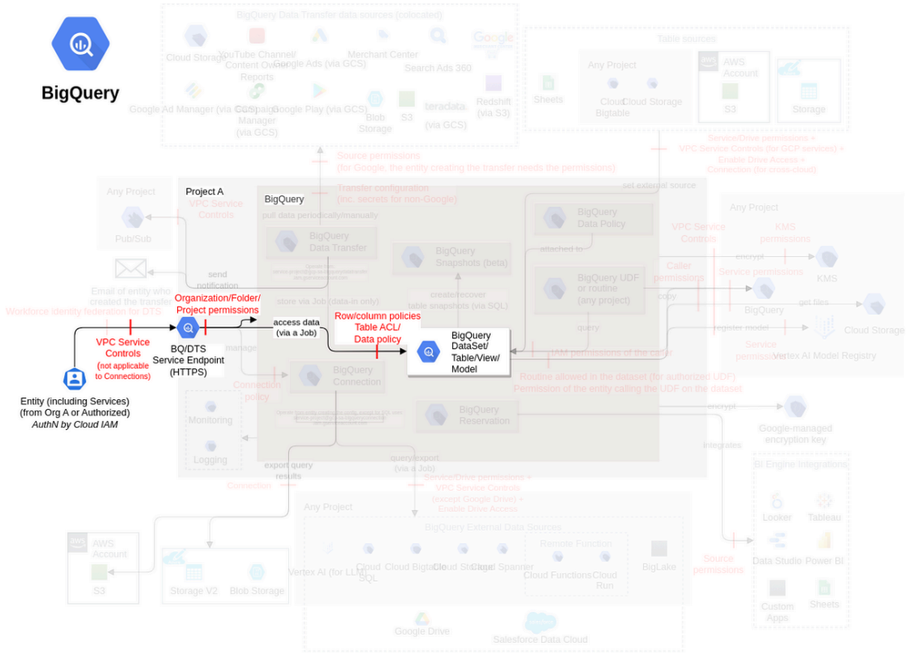


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed. Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType).	Very High	2	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Restrict access to columns and protect sensitive data	High	2	-	-

Define the criteria for the sensitivity of columns in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).				
Monitor abnormal performance of queries Monitor the abnormal behavior of a query (e.g., by using the query execution graph).	Medium	-	-	1
Use authorized metadata caching Define the requirements for metadata cache mode and staleness (30 minutes to 7 days) for each external table. Ensure the metadata cache mode and staleness of each external table are set according to their requirements.	Medium	2	-	-
Restrict access to rows with BigQuery row-level security Define the criteria for the sensitivity of rows in each table. Ensure only authorized IAM entities are allowed to access sensitive rows of a table (e.g., using BigQuery row-level security).	Medium	2	-	-

Loss of integrity and availability by copying datasets and overwriting the destination table(s)

Threat Id	Bigquery.T3
Name	Loss of integrity and availability by copying datasets and overwriting the destination table(s)
Description	Datasets can be copied to another existing dataset. During this process, the tables of the destination dataset can be overwritten. An attacker can overwrite the destination table causing a loss of integrity and availability.
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (5.7)
IAM Access	{ "AND": ["bigquery.jobs.create", "bigquery.datasets.get", "bigquery.datasets.update", "bigquery.tables.create"] }

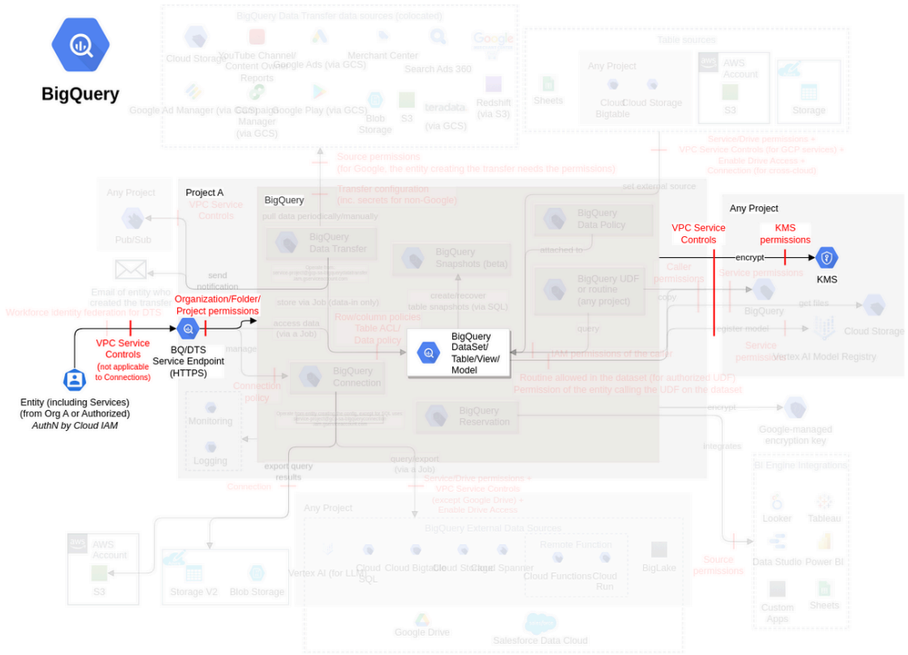


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations. Protect the sources and destinations used for infiltration/exfiltration with each table and connection, using their respective services' ThreatModel.	High	3	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Encrypt datasets and models at rest, and protect the keys	Medium	2	-	-

Maintain a list of authorized CMEKs to be used with each BigQuery dataset and model, ideally dedicated. Protect the CMEKs used by BigQuery datasets and models, using the Cloud KMS ThreatModel.				

Misconfiguration of a dataset to cause loss of integrity and availability or privilege escalation by modification of access array of a dataset

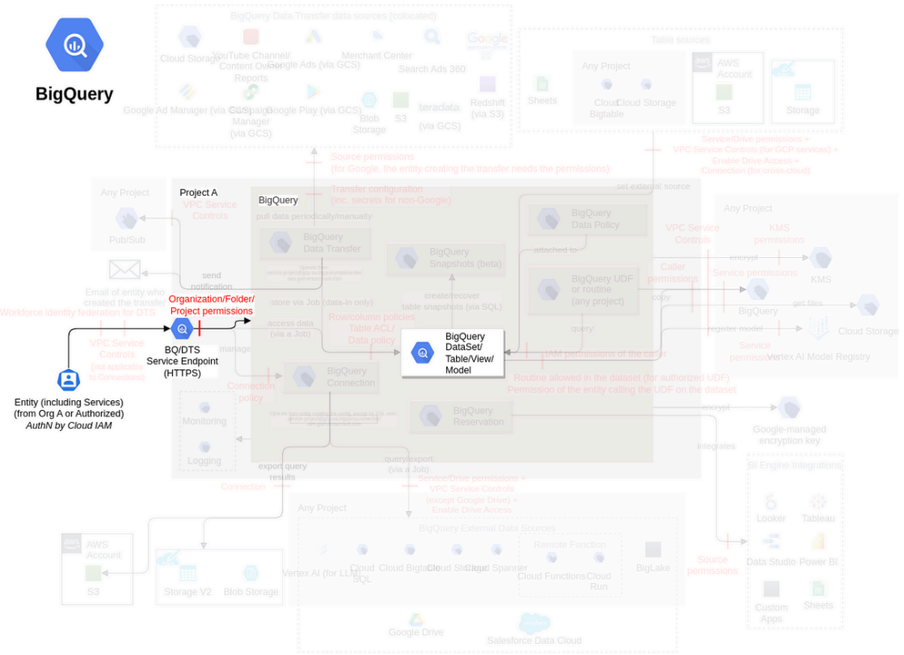
Threat Id	Bigquery.T21
Name	Misconfiguration of a dataset to cause loss of integrity and availability or privilege escalation by modification of access array of a dataset
Description	A dataset is a top-level container used to organize and control access to your tables and views. Certain default configurations and options that can be set at the dataset level, which indirectly affect the tables within that dataset. An attacker can create or update a dataset with unauthorized values for these configurations to cause loss of integrity and availability (e.g., setting an unauthorized value for defaultTableExpirationMs to delete a table automatically when its expirationTime is reached) or create or modify access for a dataset to escalate privileges.
Goal	Data manipulation
MITRE ATT&CK®	TA0004
CVSS	Medium (5.7)
IAM Access	{ "OR": ["bigquery.datasets.create", "bigquery.datasets.update"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration (i.e., defaultTableExpirationMs, defaultPartitionExpirationMs, access[], defaultEncryptionConfiguration, linkedDatasetSource, externalDatasetReference, defaultCollation, defaultRoundingMode, maxTimeTravelHours, storageBillingModel, and defaultEncryptionConfiguration) for each BigQuery dataset. Ensure the configuration of each BigQuery dataset is authorized.	Medium	2	-	-

Misconfiguration of a table to cause loss of integrity and availability

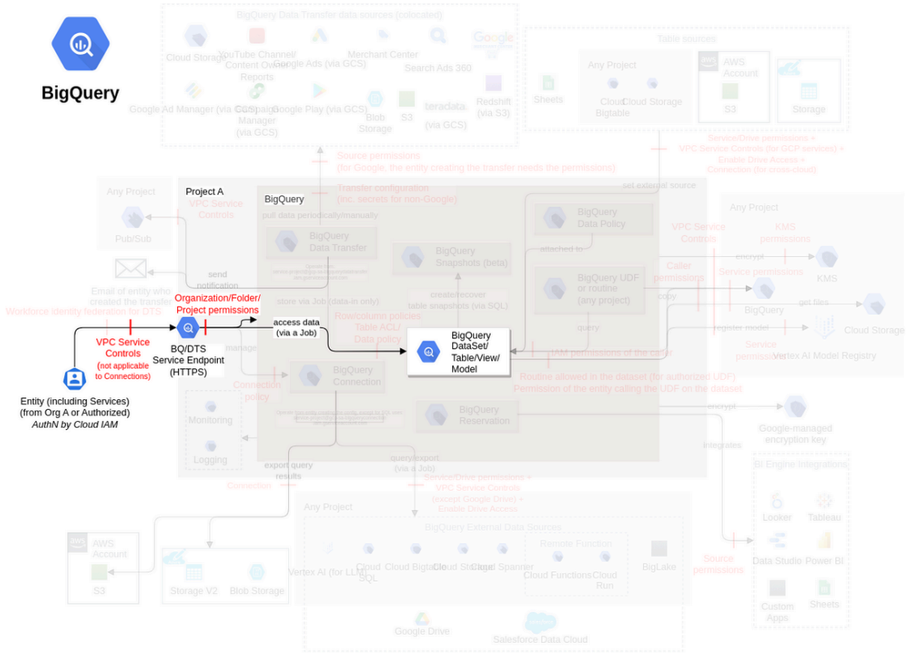
Threat Id	Bigquery.T25
Name	Misconfiguration of a table to cause loss of integrity and availability
Description	A table is a primary storage structure used to hold structured data within datasets. Standard BigQuery tables store structured data directly within BigQuery, external tables reference data stored outside BigQuery, and views are logical tables built using SQL queries. An attacker can create or update a table with unauthorized configuration to cause loss of integrity or availability (e.g., by creating or updating a materialized viewed with unauthorized value for staleness to deliberately serve outdated and potentially misleading data to users or applications, which could lead to inaccurate analysis results and misinformed business decisions, an external source with corrupted data, table with unauthorized value of expiration or an unauthorized key for encryption).
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (5.7)
IAM Access	{ "OR": ["bigquery.tables.create", "bigquery.tables.update"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration (i.e., schema, clustering, expirationTime, view, materializedView, externalDataConfiguration, encryptionConfiguration, defaultCollation, defaultRoundingMode, and tableConstraints) for each BigQuery table. Ensure the configuration of each BigQuery table is authorized.	Medium	2	-	-

Loss of integrity and availability by appending, overwriting data, or creating a table

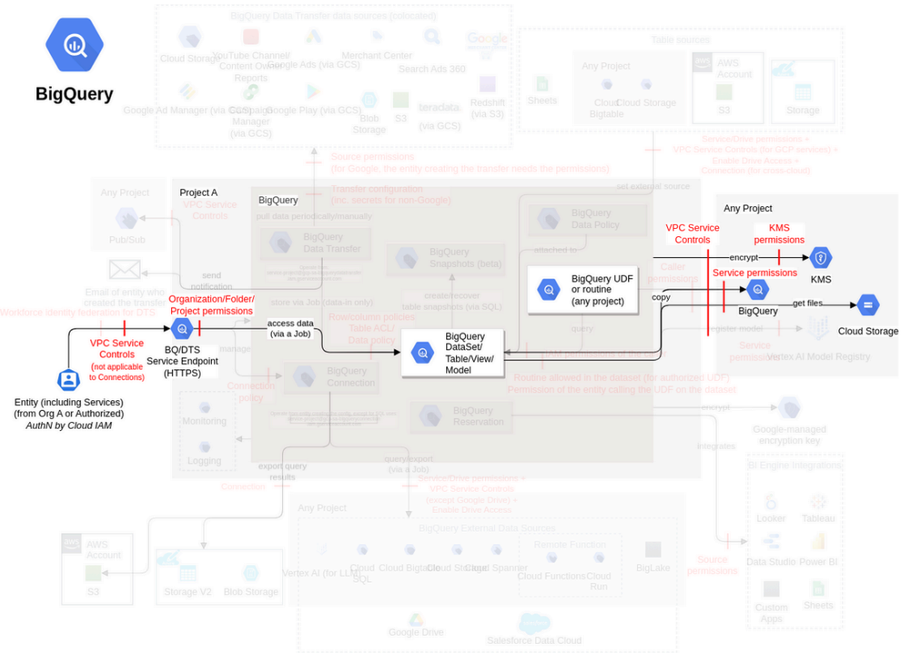
Threat Id	Bigquery.T5
Name	Loss of integrity and availability by appending, overwriting data, or creating a table
Description	Data is stored inside a BigQuery table. An attacker can create a table, overwrite table data using a load or query operation or append additional data to an existing table by performing a load-append operation or by appending query results to the table, causing a loss of data integrity and availability.
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (5.2)
IAM Access	{ "OR": ["bigquery.tables.create", "bigquery.tables.updateData", "bigquery.jobs.create"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Monitor data ingestion and data quality Monitor the abnormal number of concurrent connections and throughput for the BigQuery table (e.g., by using the Monitoring metric CONSUMER QUOTA - QUOTA LIMIT).	Very Low	-	-	1

Exfiltration of query results to an unauthorized destination table or execution of unauthorized UDFs

Threat Id	Bigquery.T20
Name	Exfiltration of query results to an unauthorized destination table or execution of unauthorized UDFs
Description	An asynchronous job can be created, which can include various types of jobs such as query jobs, load jobs, copy jobs, extract jobs. An attacker can execute an unauthorized query, provide an unauthorized destination table to store query results, overwrite destination table, update the schema for the destination table, or change the encryption of the destination table. An attacker can also execute UDFs from unauthorized Cloud Storage for purposes like exfiltration.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.8)
IAM Access	{ "AND": ["bigquery.jobs.create", { "OPTIONAL": "bigquery.tables.getData" }] }

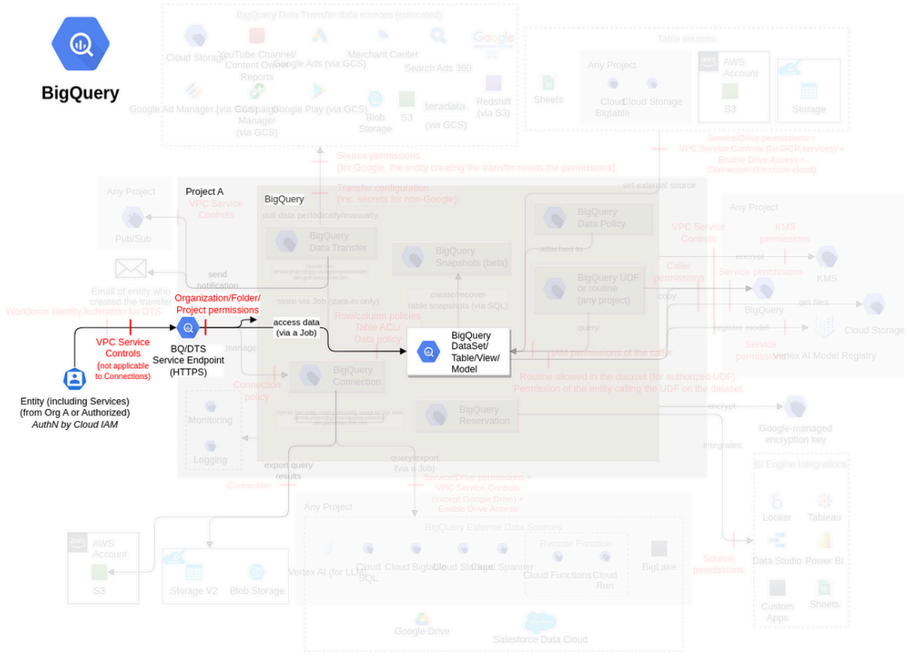


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations.	High	2	-	-
Use authorized User-Defined Functions Maintain a list of authorized Cloud Storage buckets to be used with query jobs for User-Defined Functions (UDFs). Ensure each query uses an authorized Cloud Storage bucket for a UDF. Protect the Cloud Storage buckets used for storing UDFs, using Cloud Storage ThreatModel.	High	3	-	-

Enforce SDLC process on User-Defined Functions Enforce secure SDLC process on User-Defined Functions (e.g., using source control, static analysis, dynamic analysis, peer review).	High	1	-	-
Encrypt datasets and models at rest, and protect the keys Maintain a list of authorized CMEKs to be used with each BigQuery dataset and model, ideally dedicated. Ensure only authorized CMEKs are used with each BigQuery dataset and model (e.g., using default configuration), and any unauthorized CMEKs are restricted following the Cloud KMS ThreatModel. Protect the CMEKs used by BigQuery datasets and models, using the Cloud KMS ThreatModel.	Medium	3	-	-
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration (e.g., createDisposition, writeDisposition, schemaUpdateOptions) for each asynchronous query job. Ensure the configuration of each asynchronous query job is authorized.	Low	2	-	-

Disruption of application functionality by modification of table and views configurations

Threat Id	Bigquery.T11
Name	Disruption of application functionality by modification of table and views configurations
Description	Specific properties are associated with tables and views during the creation. An attacker can modify these properties (e.g., schema, expiration time) causing downstream applications disruption or permanent data loss.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Medium (4.8)
IAM Access	{ "UNIQUE": "bigquery.tables.update" }

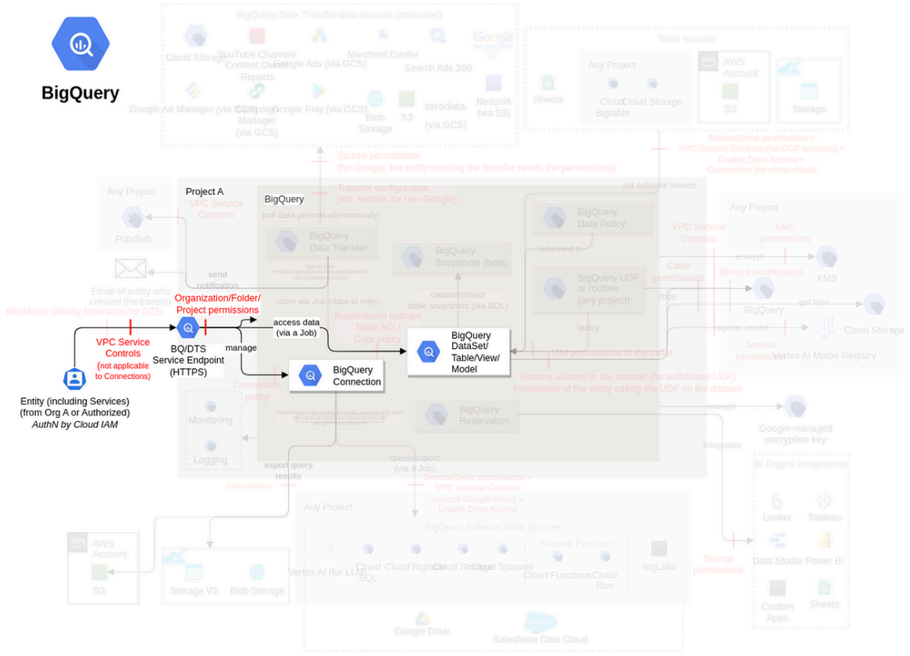


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Set the expiration time of BigQuery tables as per the requirements Define the requirements for the expiration time of each BigQuery table. Ensure the expiration time of each BigQuery table is set according to its requirements.	Medium	2	-	-
Encrypt datasets and models at rest, and protect the keys Maintain a list of authorized CMEKs to be used with each BigQuery dataset and model, ideally dedicated.	Medium	4	-	-

Ensure only authorized CMEKs are used with each BigQuery dataset and model (e.g., using default configuration), and any unauthorized CMEKs are restricted following the Cloud KMS ThreatModel. Protect the CMEKs used by BigQuery datasets and models, using the Cloud KMS ThreatModel. Ensure AEAD encryption functions are used to encrypt data at the column level.				
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration (i.e., defaultTableExpirationMs, defaultPartitionExpirationMs, access[], defaultEncryptionConfiguration, linkedDatasetSource, externalDatasetReference, defaultCollation, defaultRoundingMode, maxTimeTravelHours, storageBillingModel, and defaultEncryptionConfiguration) for each BigQuery dataset. Ensure the configuration of each BigQuery dataset is authorized.	Medium	2	-	-

Restricting access to datasets, tables, and connections by modification of privileges

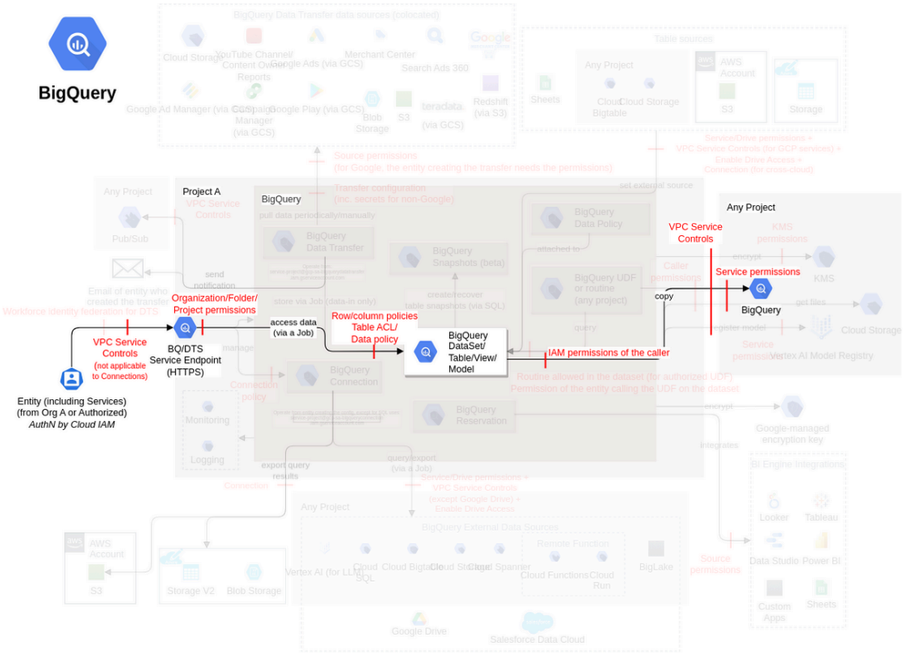
Threat Id	Bigquery.T10
Name	Restricting access to datasets, tables, and connections by modification of privileges
Description	IAM permissions can be used to allow access to perform actions on BigQuery datasets, tables, and connections. An attacker can limit access to tables, rows, or columns for legitimate users or allow unauthorized users to access by modifying the permissions.
Goal	Launch another attack
MITRE ATT&CK®	TA0004
CVSS	Medium (4.2)
IAM Access	{ "OR": ["bigquery.datasets.setIamPolicy", "bigquery.rowAccessPolicies.setIamPolicy", "bigquery.tables.setIamPolicy", "bigquery.connections.setIamPolicy", "bigquery.rowAccessPolicies.update"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-

Table exfiltration by cloning

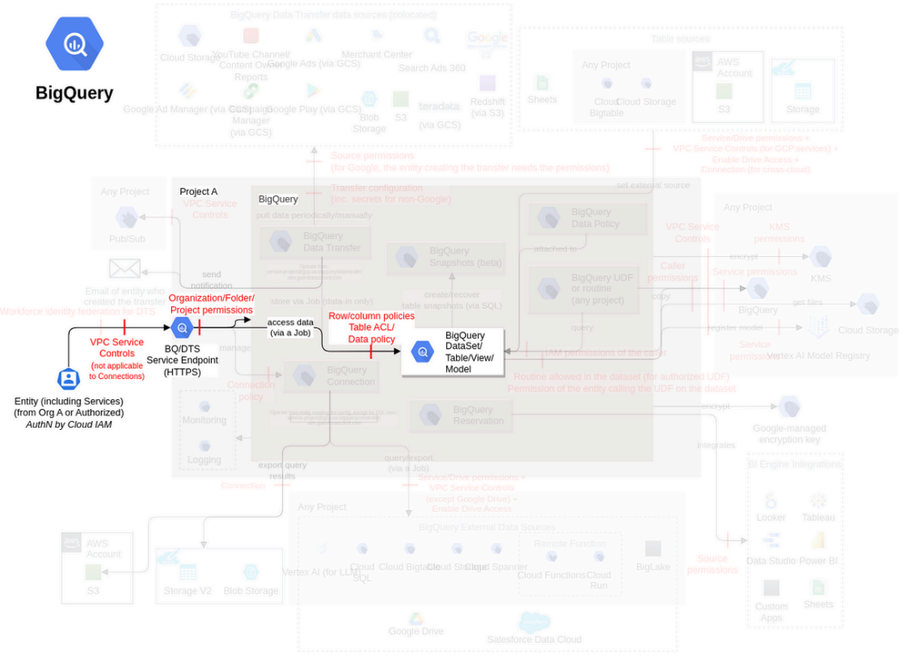
Threat Id	Bigquery.T19
Name	Table exfiltration by cloning
Description	A table clone is a writable copy of another table. It can be created in another project within the same region. An attacker can clone a table to an unauthorized project to exfiltrate it.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.2)
IAM Access	{ "UNIQUE": "bigquery.jobs.create" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Limit the amount of cloned data Define the requirements for setting the time travel of each BigQuery dataset. Ensure the time travel of each BigQuery dataset is set according to its requirements.	Medium	2	-	-
Ensure authorized configuration(s) are used with jobs Define the authorized configuration for each job. Ensure each job uses an authorized configuration.	Medium	2	-	-

Exfiltration of data by exporting tables to other services

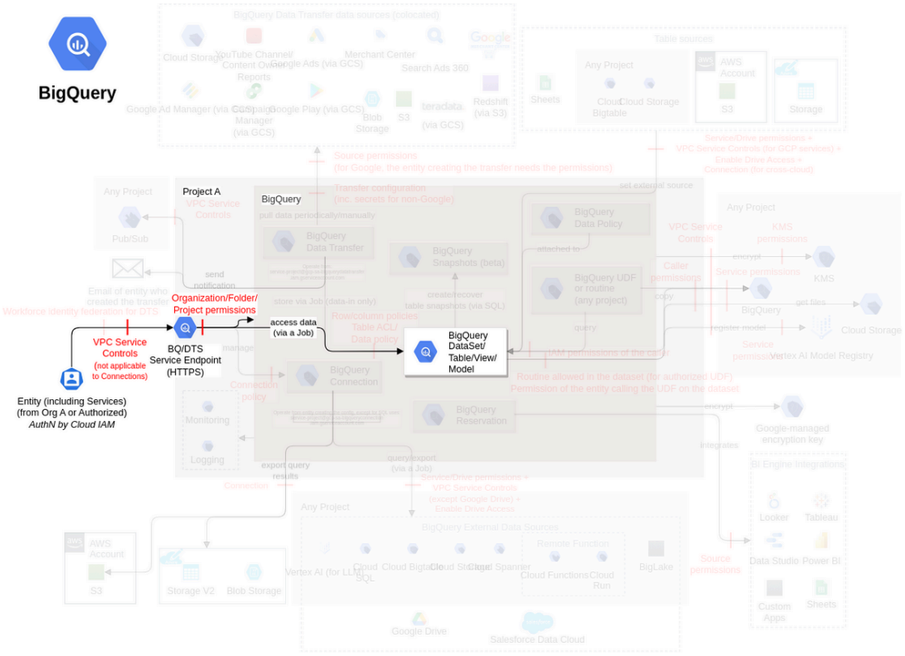
Threat Id	Bigquery.T6
Name	Exfiltration of data by exporting tables to other services
Description	Data can be sent to other services for storing or processing it. An attacker can export data to either their destination table or a service like Cloud Storage, Data Studio, or DLP.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.2)
IAM Access	{ "AND": [{ "OPTIONAL": { "AND": ["storage.objects.create", "storage.objects.delete"] } }, "bigquery.tables.export", "bigquery.jobs.create", "bigquery.tables.getData"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
De-identify sensitive data using Cloud DLP Ensure sensitive data is identified and redacted (e.g., using Cloud DLP).	Medium	1	-	-

Destruction of data by deleting dataset or table

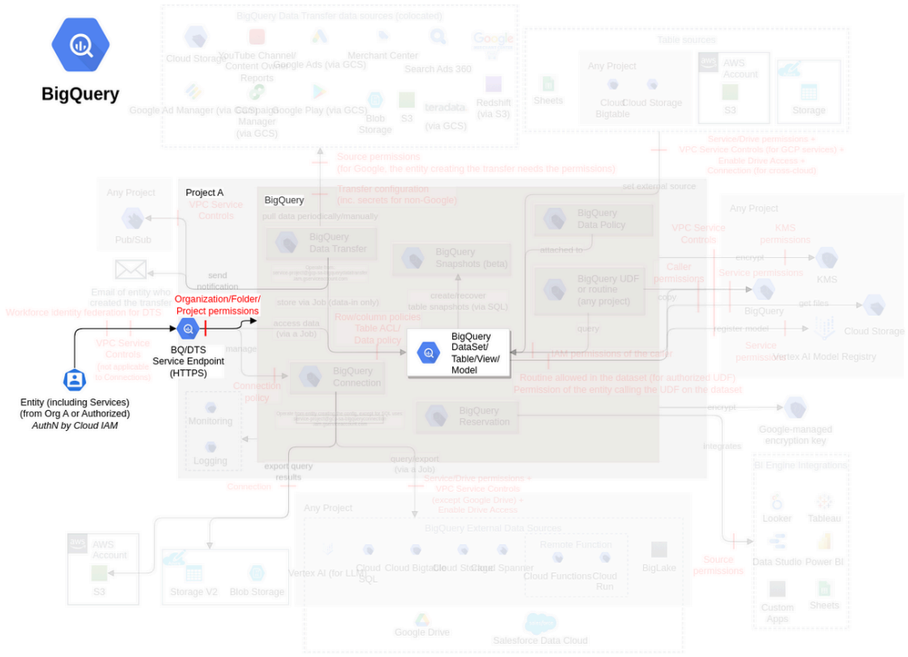
Threat Id	Bigquery.T1
Name	Destruction of data by deleting dataset or table
Description	A project has a dataset. Inside a dataset, a table is created, and data is stored inside this table. An attacker can delete the table or a dataset causing a loss of data.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Low (3.5)
IAM Access	{ "OR": ["bigquery.tables.delete", "bigquery.datasets.delete"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Create and secure backups (e.g., by snapshots or exports) of BigQuery dataset(s) and table(s) Define the requirements for the backup of each BigQuery dataset and table. Ensure each BigQuery dataset and table is backed up (e.g., by creating snapshots or exports) according to the requirements and is restorable.	Medium	2	-	-

Unauthorized data access via cache

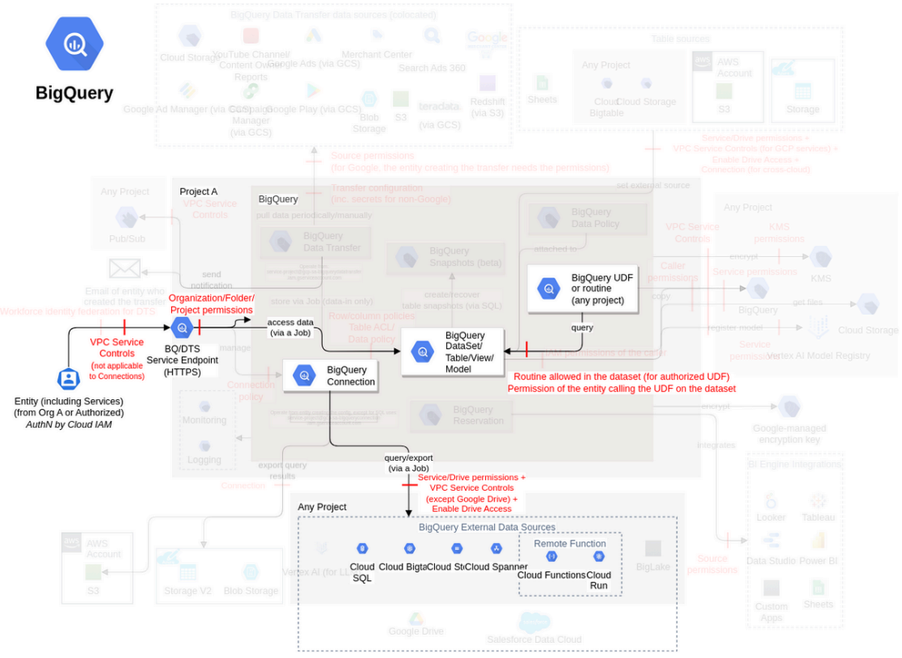
Threat Id	Bigquery.T26
Name	Unauthorized data access via cache
Description	Users can read the contents of tables within BigQuery, enabling them to query and retrieve data stored in specific tables. Results from queries against table snapshots can also be returned from the cache, even if the caller loses access to the data within the last 24 hours. An attacker can retrieve data from BigQuery tables or access the query results from the cache without making any new queries.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Low (2.1)
IAM Access	{ "AND": ["bigquery.tables.getData", { "OPTIONAL": "datacatalog.categories.fineGrainedGet" }] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Restrict access to columns and protect sensitive data Define the criteria for the sensitivity of columns in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).	High	2	-	-
Ensure authorized configuration(s) are used with jobs Define the authorized configuration for each job. Ensure each job uses an authorized configuration.	Medium	2	-	-

DoS by throttling limit

Threat Id	Bigquery.T7
Name	DoS by throttling limit
Description	DoS by exhausting quota limit for BigQuery GCP enforces quotas on BigQuery resources (e.g., concurrent rate limit for interactive queries is limited to 100 queries). An attacker can exhaust the current quota limit for interactive and federated queries, load or export jobs, table and metadata, streaming inserts, and UDF limits to perform Denial of Service by sending many requests.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Low (2.0)
IAM Access	{ "UNIQUE": "bigquery.depends" }

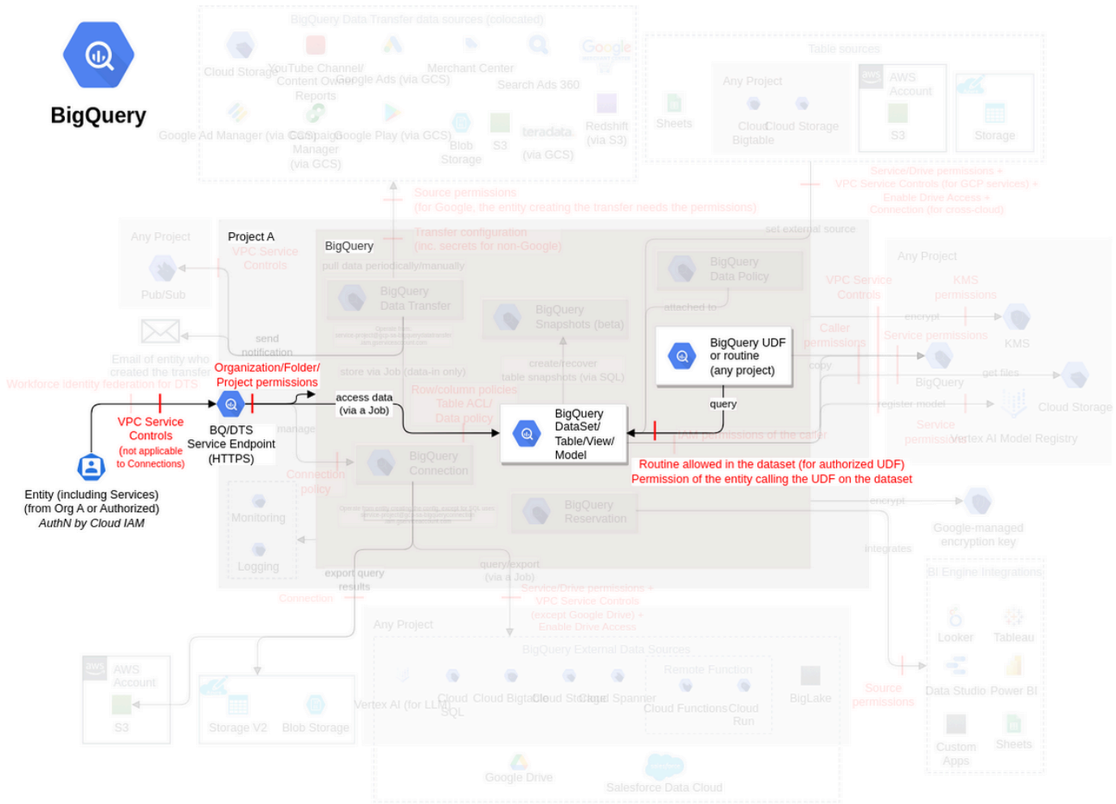


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Set the quotas on BigQuery as per the API usage statistics Ensure the quotas on BigQuery (e.g., query limits, streaming insert limits, etc.) are set as per the API usage statistics.	Medium	1	-	-

User-Defined Functions *(subclass of Dataset and tables, FC2)*

A UDF accepts columns of input, performs actions on the input, and returns the result of those actions as a value.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

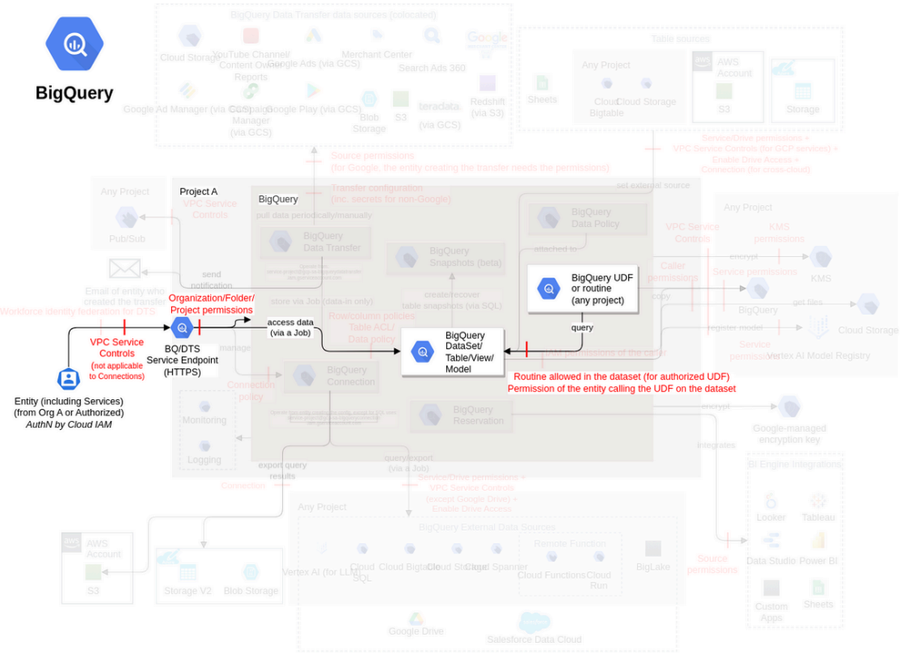
Action	IAM Permission
Creates a new routine in the dataset.	bigquery.routines.create

Threat List

Name	CVSS
Loss of integrity and availability by manipulating data using UDFs	Medium (5.2)

Loss of integrity and availability by manipulating data using UDFs

Threat Id	Bigquery.T8
Name	Loss of integrity and availability by manipulating data using UDFs
Description	A User-Defined Function (UDF) or routine allows the creation of a function using a SQL expression or JavaScript code. A UDF accepts columns of input, performs actions on the input, and returns the result of those actions as a value. An attacker can write temporary UDFs to perform actions like updating columns or extracting PII from the tables.
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (5.2)
IAM Access	{ "UNIQUE": "bigquery.routines.create" }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed. Define the authorized configuration (i.e., defaultTableExpirationMs, defaultPartitionExpirationMs, access[], defaultEncryptionConfiguration, linkedDatasetSource, externalDatasetReference, defaultCollation, defaultRoundingMode, maxTimeTravelHours, storageBillingModel, and defaultEncryptionConfiguration) for each BigQuery dataset. Ensure the configuration of each BigQuery dataset is authorized.	Very High	3	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-

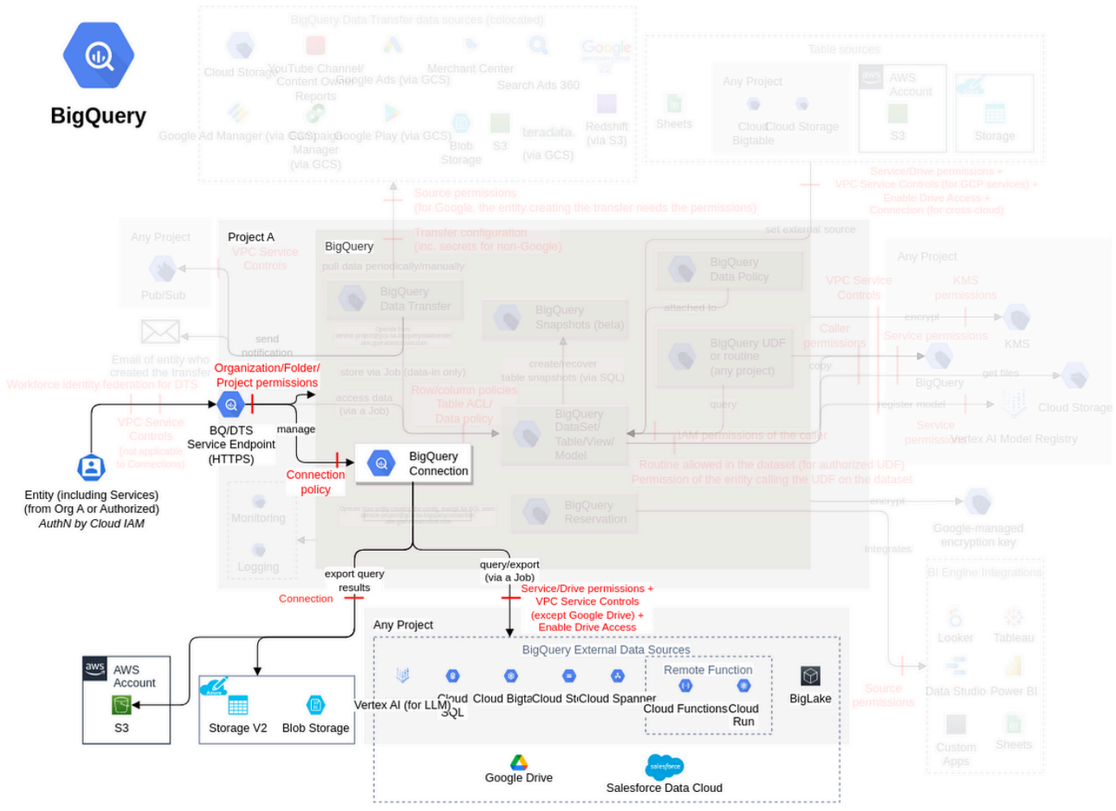
Restrict access to columns and protect sensitive data Define the criteria for the sensitivity of columns in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).	High	2	-	-
Restrict access to rows with BigQuery row-level security Define the criteria for the sensitivity of rows in each table. Ensure only authorized IAM entities are allowed to access sensitive rows of a table (e.g., using BigQuery row-level security).	Medium	2	-	-

BigQuery connections and BigQuery Omni

(subclass of Dataset and tables, FC3)

To create a connection for federated queries when adding data from external data sources or exporting data to cross Cloud Storages.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

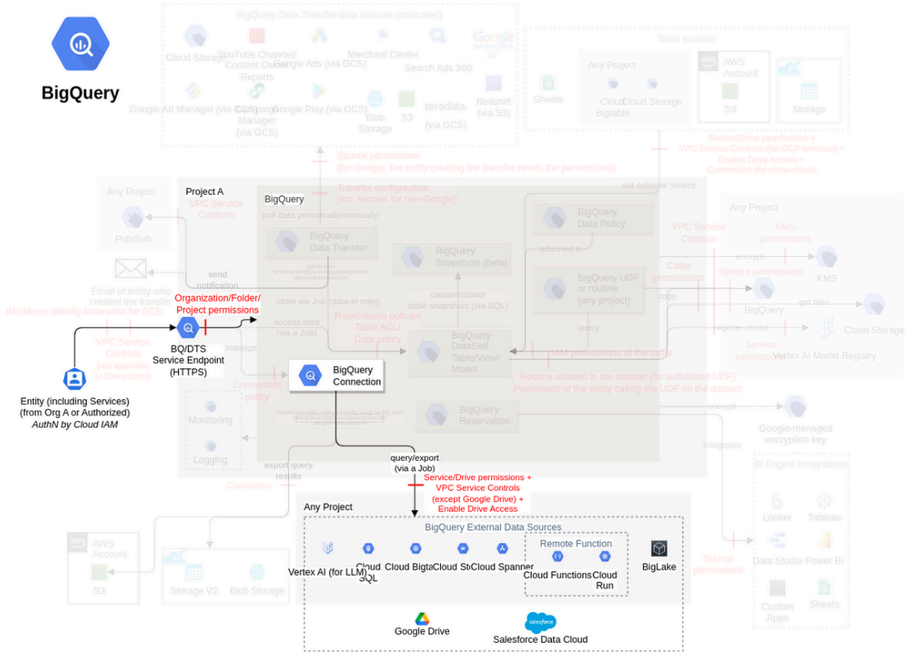
Action	IAM Permission
Creates a new connection.	bigquery.connections.create

Threat List

Name	CVSS
Unauthorized access to data by changing connection configurations	Medium (5.7)
Data exfiltration by exporting query results	Medium (4.5)

Unauthorized access to data by changing connection configurations

Threat Id	Bigquery.T2
Name	Unauthorized access to data by changing connection configurations
Description	BigQuery federations enable BigQuery to query data residing in Cloud SQL or other places in real-time, without copying or moving data. For each federation, a connection is created. An attacker can use an existing connection by viewing the connection list or sharing it with another user to get unauthorized access to tables residing in other sources.
Goal	Launch another attack
MITRE ATT&CK®	TA0001
CVSS	Medium (5.7)
IAM Access	{ "OR": ["bigquery.connections.update", "bigquery.connections.get", "bigquery.connections.list", "bigquery.connections.getIamPolicy", "bigquery.connections.use", "bigquery.connections.setIamPolicy"] }

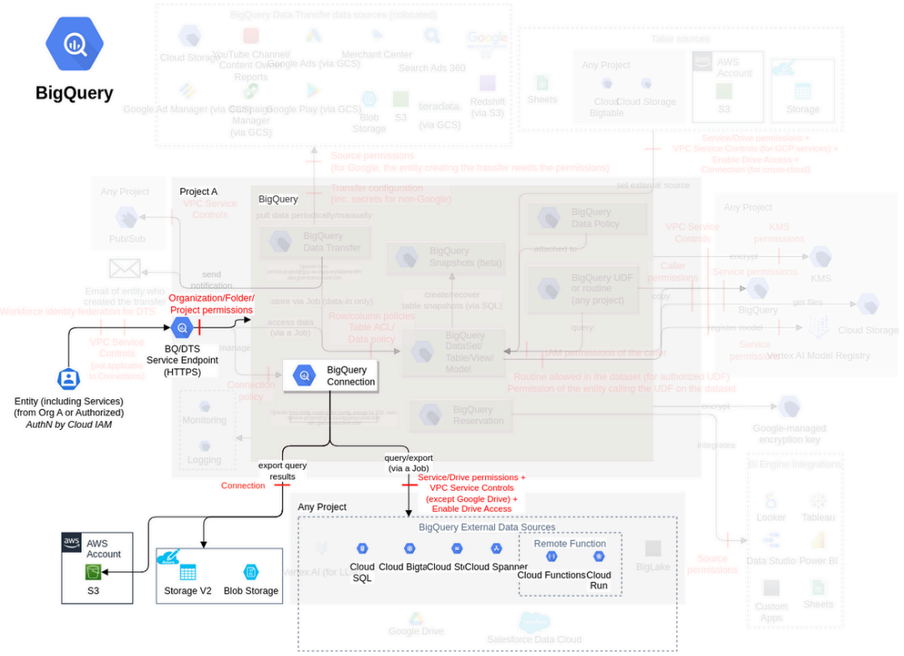


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations. Protect the sources and destinations used for infiltration/exfiltration with each table and connection, using their respective services' ThreatModel.	High	3	-	-
Control access to tables and views Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns). Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	High	2	-	-
Restrict access to columns and protect sensitive data Define the criteria for the sensitivity of columns in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).	High	4	-	-

Define the criteria to use authorized data policies for each column in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table by using data policies.				
Restrict access to rows with BigQuery row-level security Define the criteria for the sensitivity of rows in each table. Ensure only authorized IAM entities are allowed to access sensitive rows of a table (e.g., using BigQuery row-level security).	Medium	2	-	-

Data exfiltration by exporting query results

Threat Id	Bigquery.T15
Name	Data exfiltration by exporting query results
Description	BigQuery Omni uses BigQuery connections to export query results to GCP services (e.g., Spanner, BigTable, Cloud Storage), Amazon S3, or Azure Storage. An attacker can create a connection to export query results to their GCP services, Amazon S3, or Azure Storage to exfiltrate data.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.5)
IAM Access	{ "AND": ["bigquery.connections.create", "bigquery.jobs.create", "bigquery.tables.getData", "bigquery.tables.export", "bigquery.connections.use"] }

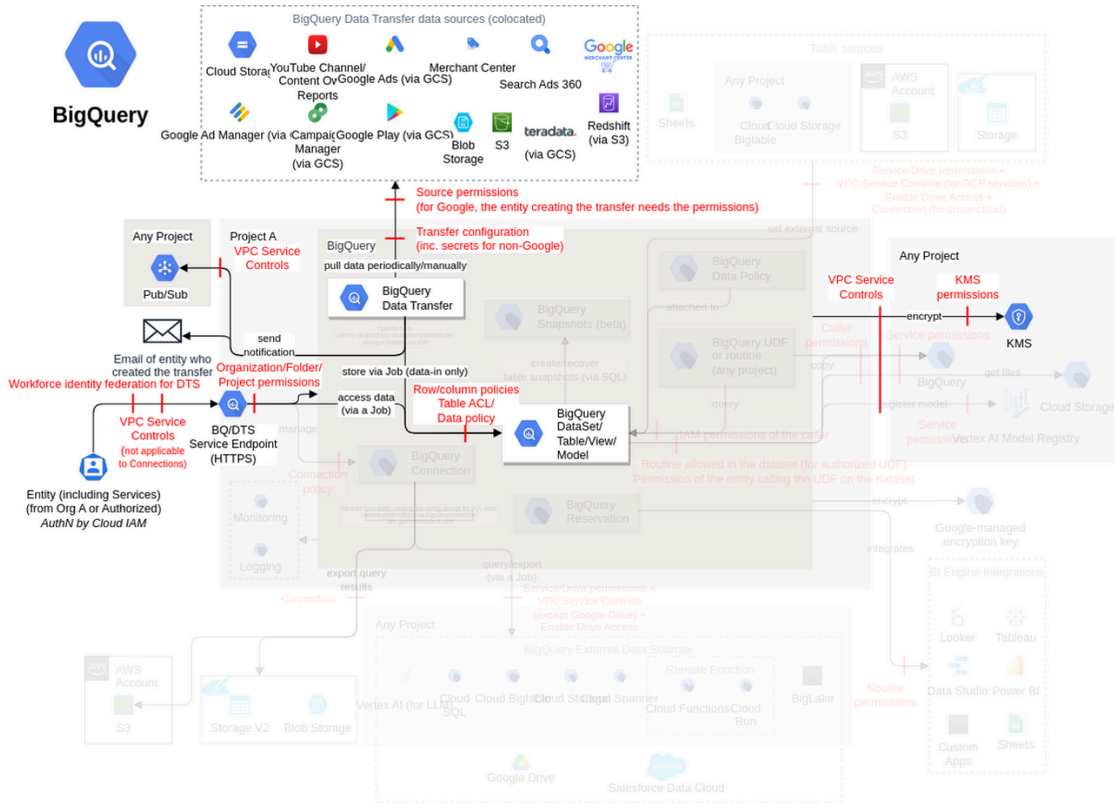


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Limit usage of BigQuery Omni Define the requirements for using BigQuery Omni (AWS and/or Azure). Ensure the usage of BigQuery Omni as per the requirements (e.g., using organizational constraint constraints/bigquery.disableBQOmniAWS and constraints/bigquery.disableBQOmniAzure).	Very High	2	-	-
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations. Protect the sources and destinations used for infiltration/exfiltration with each table and connection, using their respective services' ThreatModel.	High	3	-	-

BigQuery Data Transfer *(subclass of Dataset and tables, FC4)*

You can transfer external data from SaaS applications to Google BigQuery on a regular basis.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

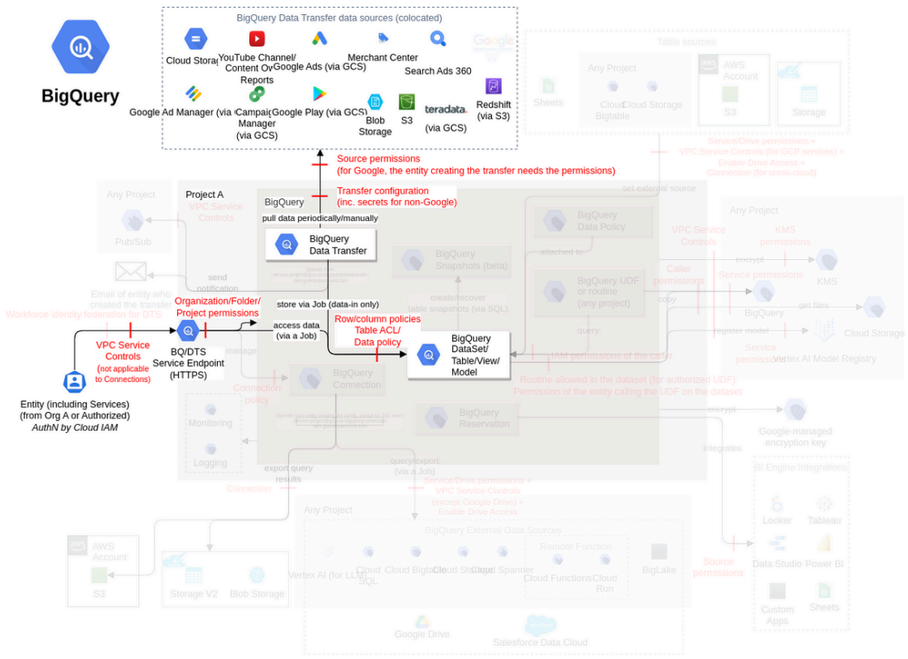
Action	IAM Permission
Creates a new data transfer configuration.	bigquery.transfers.update

Threat List

Name	CVSS
Data exfiltration by updating the destination dataset in transfer and transfer credentials	Medium (5.2)

Data exfiltration by updating the destination dataset in transfer and transfer credentials

Threat Id	Bigquery.T13
Name	Data exfiltration by updating the destination dataset in transfer and transfer credentials
Description	The BigQuery Data Transfer Service automates data movement into BigQuery on a scheduled, managed basis using the credentials of the user who created it. An attacker can update the destination dataset or transfer credentials of a transfer job and configuration to their own dataset and give them full control over the transfer. An attacker can also transfer data from unauthorized sources.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (5.2)
IAM Access	{ "AND": ["bigquery.transfers.update", "bigquery.datasets.get", "bigquery.datasets.update"] }

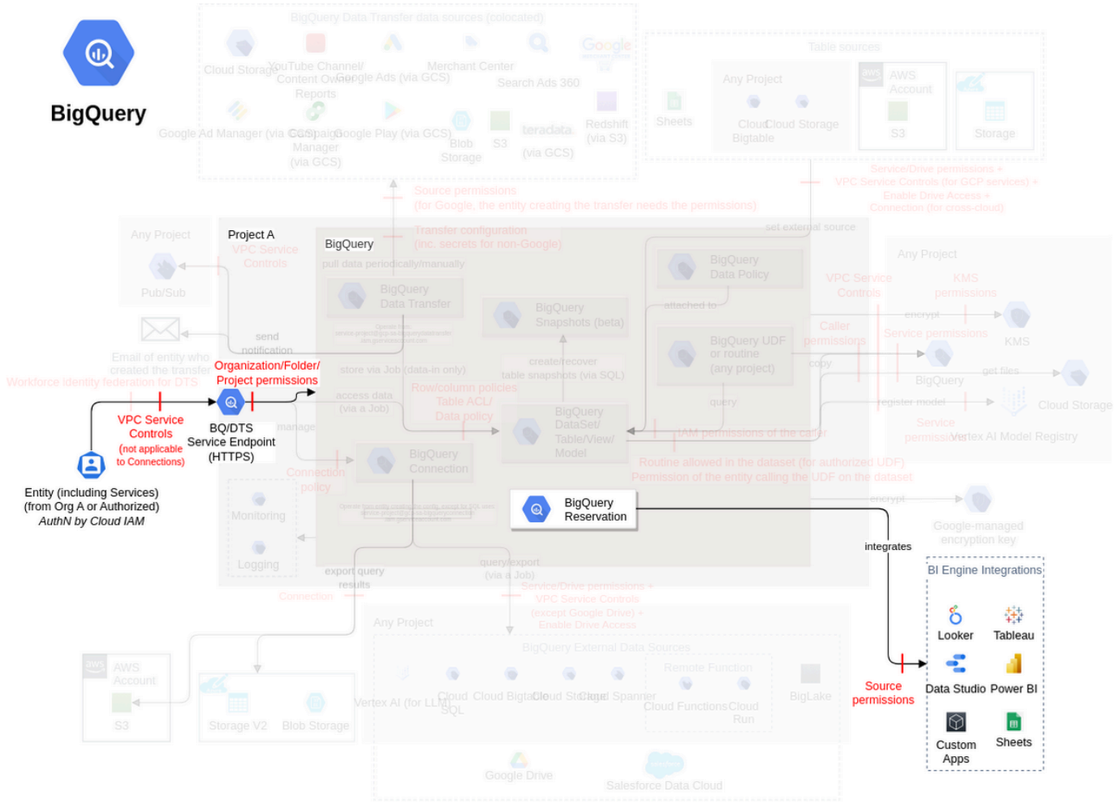


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure and use the authorized sources and their respective authorized configurations with BigQuery Data Transfer Maintain a list of authorized sources (e.g., Cloud Storage, Amazon S3, etc.) and their respective authorized configurations to be used with each transfer. Ensure each transfer uses an authorized source and its authorized configuration. Protect the sources used with each transfer, using the respective service's ThreatModel.	High	3	-	-
Enable logs for BigQuery Data Transfer Ensure Cloud Audit logs for BigQuery Data Transfer are enabled (ref).	Low	1	-	-

BigQuery reservation *(subclass of Dataset and tables, FC5)*

BI Engine allows you to analyze data stored in BigQuery with sub-second query response time and high concurrency using BI reservations.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

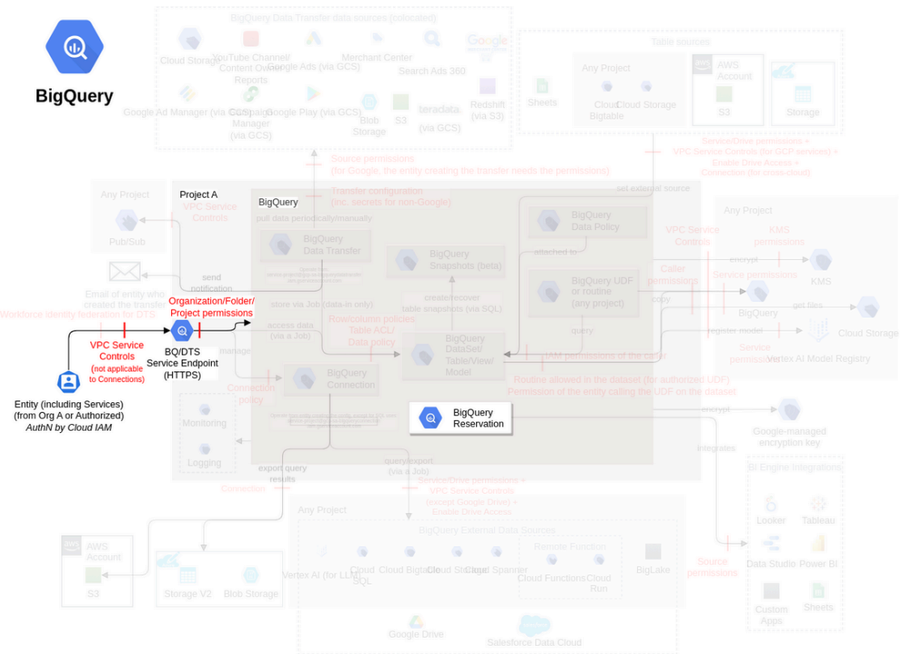
Action	IAM Permission
Creates a new reservation resource.	bigquery.reservations.create

Threat List

Name	CVSS
Denial of Service/denial of wallet by removing/creating reservations	Medium (4.8)

Denial of Service/denial of wallet by removing/creating reservations

Threat Id	Bigquery.T12
Name	Denial of Service/denial of wallet by removing/creating reservations
Description	A slot is a dedicated vCPU that runs queries. Each slot is allocated to a reservation. An attacker can remove a reservation, failing any jobs that are currently executing with slots from that reservation or decreasing the performance for future jobs. An attacker can also create a reservation with unauthorized configurations or modify an existing reservation to achieve the same objective or incur cost.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Medium (4.8)
IAM Access	{ "OR": [{ "AND": ["bigquery.reservations.delete", "bigquery.reservationAssignments.delete"] }, { "AND": ["bigquery.reservationAssignments.create", { "OR": ["bigquery.reservations.create", "bigquery.reservations.update"] }] }] }



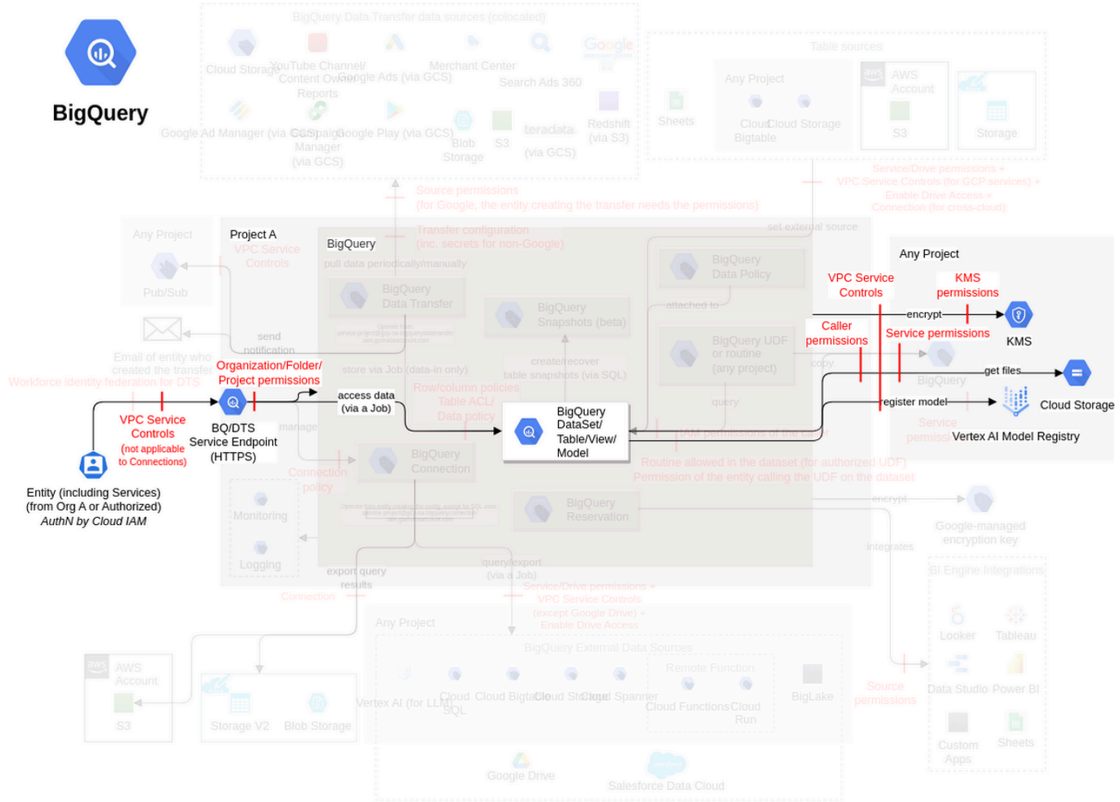
Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Monitor BigQuery capacity and utilization Monitor slot consumption (e.g., using slot recommender), job concurrency, job execution time, job errors, and bytes processed across the entire organization (e.g., using BigQuery Admin Resource Charts). Monitor slot capacity (e.g., using slot estimator) to estimate the correct number of slots for the BigQuery workload.	Medium	-	-	2
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType). Ensure each reservation and its assignments use an authorized configuration.	Medium	2	-	2

Monitor the creation/modification of unauthorized reservation (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and "google.cloud.bigquery.reservation.v1.ReservationService.UpdateReservation", and their fields request.reservation.autoscale.maxSlots and request.reservation.edition). Monitor the creation of unauthorized assignment (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and its fields request.assignment.assignee, request.assignment.jobType, and request.parent).				

BigQuery ML *(subclass of Dataset and tables, FC6)*

You can create and execute machine learning models in BigQuery using standard SQL queries.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

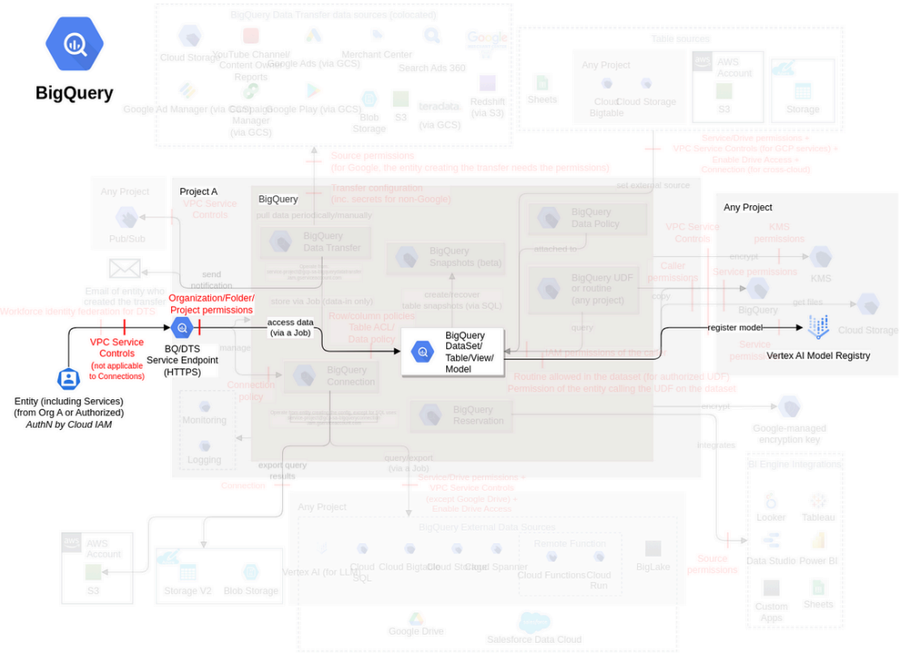
Action	IAM Permission
Create new models.	bigquery.models.create

Threat List

Name	CVSS
Model exfiltration by registering BigQuery ML models with the Vertex AI Model Registry	Medium (4.8)
Importing malicious models in BigQuery	Medium (4.7)
BigQuery ML model exfiltration	Medium (4.2)
Loss of the integrity of training model	Medium (4.2)
Permanent loss of a BigQuery ML model by modifying its expiration time	Medium (4.1)

Model exfiltration by registering BigQuery ML models with the Vertex AI Model Registry

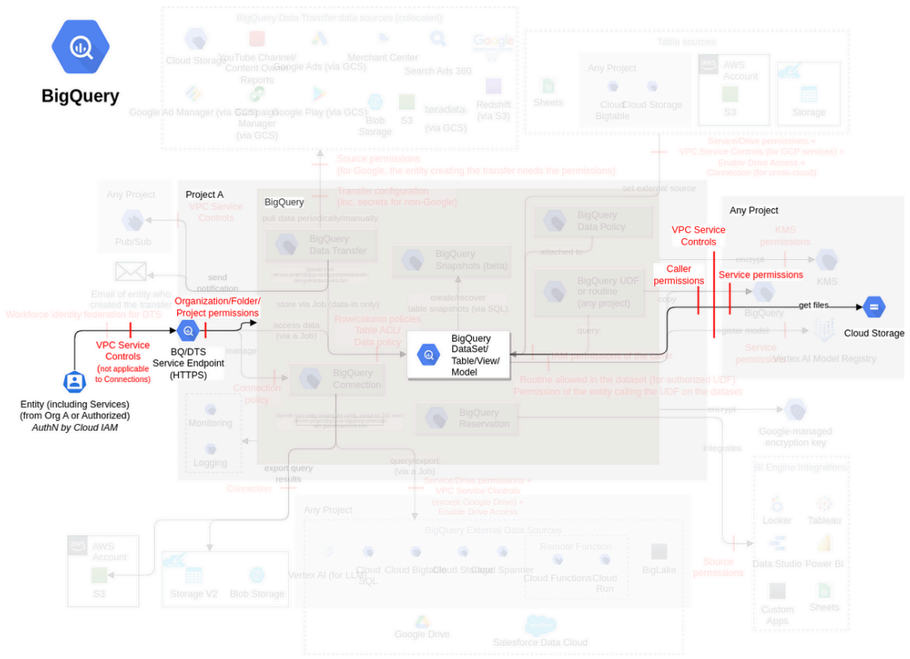
Threat Id	Bigquery.T18
Name	Model exfiltration by registering BigQuery ML models with the Vertex AI Model Registry
Description	BigQuery ML models can be integrated with the Vertex AI Model Registry for management purposes. An attacker can register an existing model with their Vertex AI Model Registry to exfiltrate the model.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.8)
IAM Access	{ "OR": ["bigquery.jobs.create", "bigquery.models.updateData"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Register BigQuery models as per the requirements Define the requirements to register the BigQuery models with the Vertex AI Model Registry for each BigQuery model. Ensure each BigQuery model is registered with the Vertex AI Model Registry according to its requirement.	Medium	2	-	-

Importing malicious models in BigQuery

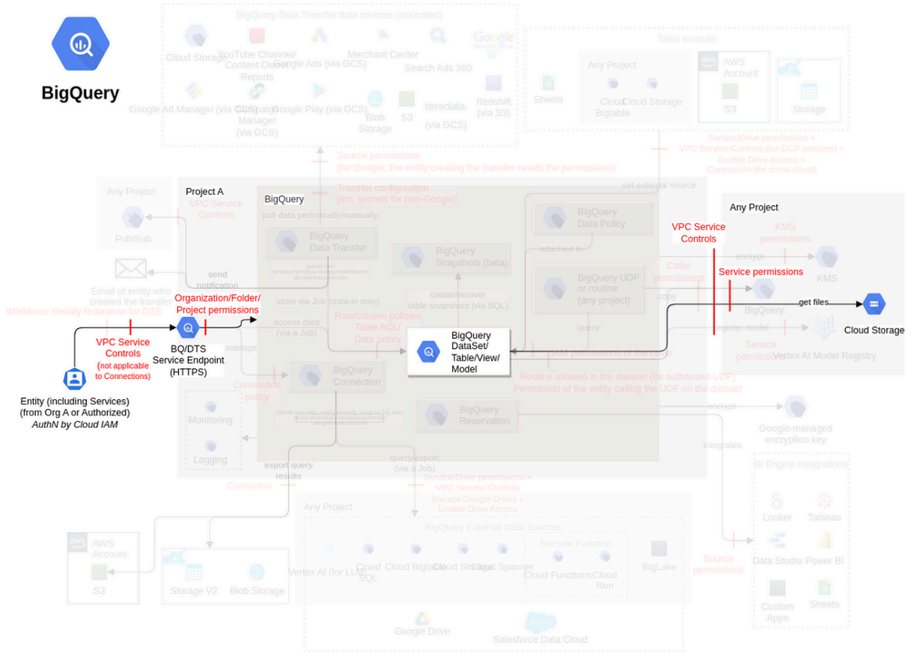
Threat Id	Bigquery.T24
Name	Importing malicious models in BigQuery
Description	Models can be imported from Cloud Storage buckets into BigQuery. An attacker can import a malicious or unauthorized model into BigQuery to perform harmful actions within BigQuery, affecting the integrity of the system to cause disruptions, potentially access and manipulate sensitive data within BigQuery, or misuse resources, such as excessive consumption of computing resources.
Goal	Disruption of Service
MITRE ATT&CK®	TA0002
CVSS	Medium (4.7)
IAM Access	{ "AND": ["bigquery.jobs.create", "storage.objects.get"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations.	High	2	-	-

BigQuery ML model exfiltration

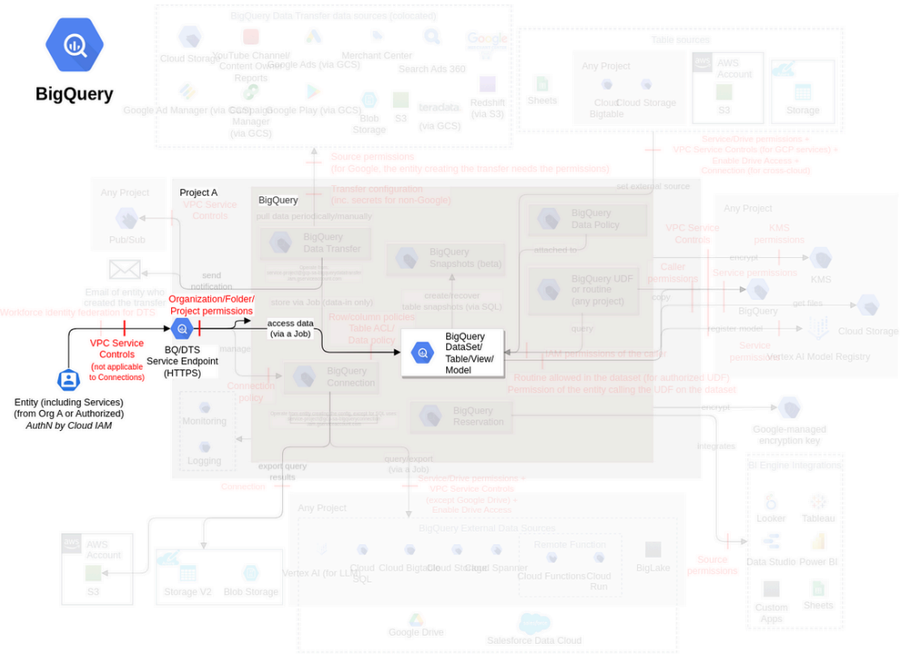
Threat Id	Bigquery.T23
Name	BigQuery ML model exfiltration
Description	BigQuery ML models can be exported to Cloud Storage. An attacker can steal a model by exporting it to an unauthorized Cloud Storage.
Goal	Data theft
MITRE ATT&CK®	TA0010
CVSS	Medium (4.2)
IAM Access	{ "AND": ["bigquery.models.export", "bigquery.jobs.create", "storage.objects.create"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Secure the authorized sources and destinations used with tables, models, and connections Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection. Ensure each table, model, and connection uses authorized sources and destinations.	High	2	-	-

Loss of the integrity of training model

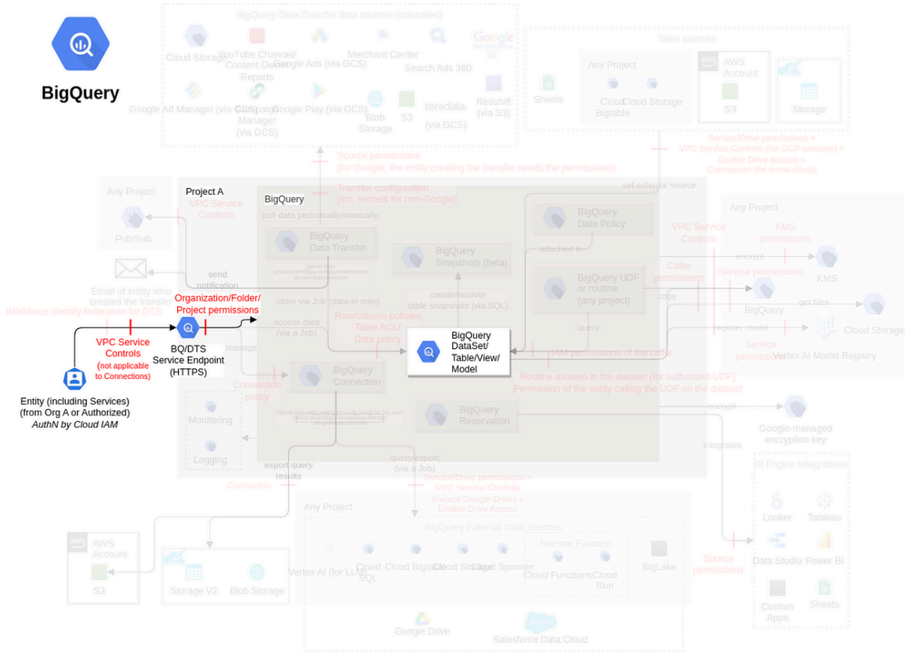
Threat Id	Bigquery.T4
Name	Loss of the integrity of training model
Description	ML models train on data and the accuracy of the model depends on the quantity and quality of training data. The training data is stored in the form of tables or views. An attacker can decrease the quality of a model by adding bogus data into tables and views or removing data from them, decreasing the efficiency of the model created and harming the business decisions made on the basis of predictions from this model.
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (4.2)
IAM Access	{ "AND": ["bigquery.jobs.create", { "OR": ["bigquery.models.updateData", "bigquery.models.updateMetadata"] }] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Monitor data ingestion and data quality Monitor the abnormal number of concurrent connections and throughput for the BigQuery table (e.g., by using the Monitoring metric CONSUMER QUOTA - QUOTA LIMIT). Monitor the quality of data used with the ML models (e.g., by data profiling).	Low	-	-	2

Permanent loss of a BigQuery ML model by modifying its expiration time

Threat Id	Bigquery.T22
Name	Permanent loss of a BigQuery ML model by modifying its expiration time
Description	A model's expiration time in BigQuery determines when it will be automatically deleted, serving as its "time to live" (TTL) and can also be adjusted after the model has been created. An attacker can update the expiration time of a model to cause its permanent loss.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Medium (4.1)
IAM Access	{ "UNIQUE": "bigquery.models.updateMetadata" }

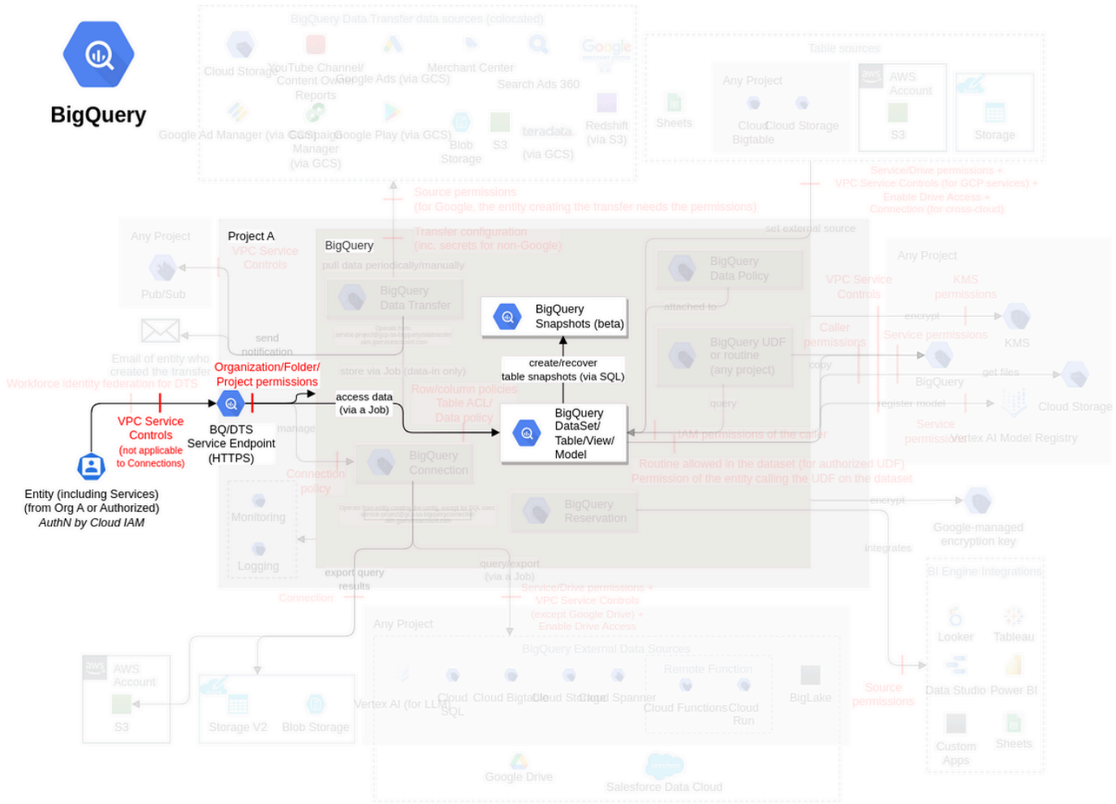


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Set an authorized expiration time for each ML model Define the authorized expiration time for each ML model. Ensure the expiration time for each ML model is authorized.	Medium	2	-	-

Table snapshot *(subclass of Dataset and tables, FC7)*

A BigQuery table snapshot preserves the contents of a table (called the base table) at a particular time. You can save a snapshot of a current table, or create a snapshot of a table as it was at any time in the past seven days.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

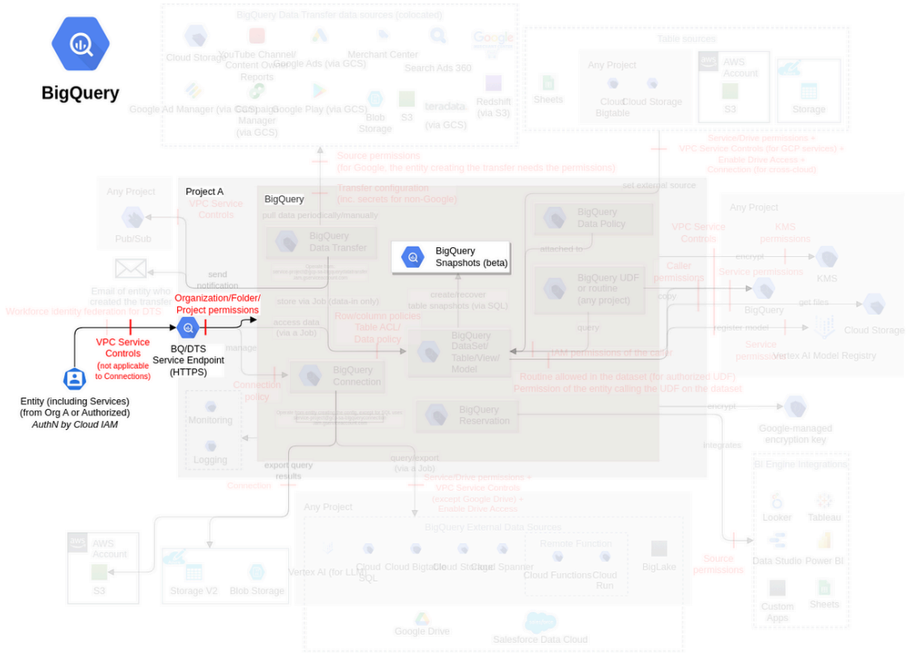
Action	IAM Permission
Create new table snapshots.	bigquery.tables.createSnapshot

Threat List

Name	CVSS
Loss of data during recovery by deleting a snapshot	Medium (4.3)

Loss of data during recovery by deleting a snapshot

Threat Id	Bigquery.T14
Name	Loss of data during recovery by deleting a snapshot
Description	Snapshots can be used to restore previous data. An attacker (or someone by negligence) can delete snapshots to block data recovery.
Goal	Data manipulation
MITRE ATT&CK®	TA0040
CVSS	Medium (4.3)
IAM Access	{ "UNIQUE": "bigquery.tables.deleteSnapshot" }

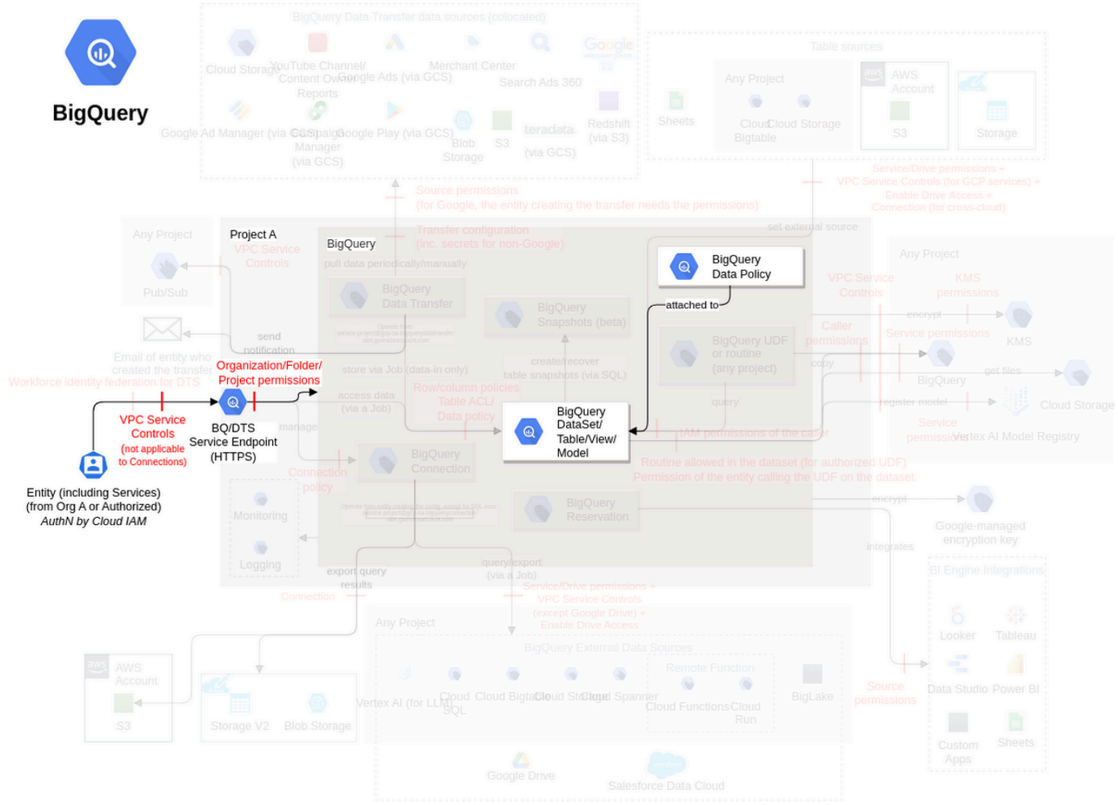


Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Create and secure backups (e.g., by snapshots or exports) of BigQuery dataset(s) and table(s) Define the requirements for the backup of each BigQuery dataset and table. Ensure each BigQuery dataset and table is backed up (e.g., by creating snapshots or exports) according to the requirements and is restorable.	Medium	2	-	-

Data policy *(subclass of Dataset and tables, FC8)*

Policy tags are tags with access control policies that can be applied to sub-resources.

Data Flow Diagram (DFD)



Actions and IAM Permissions to deny the feature

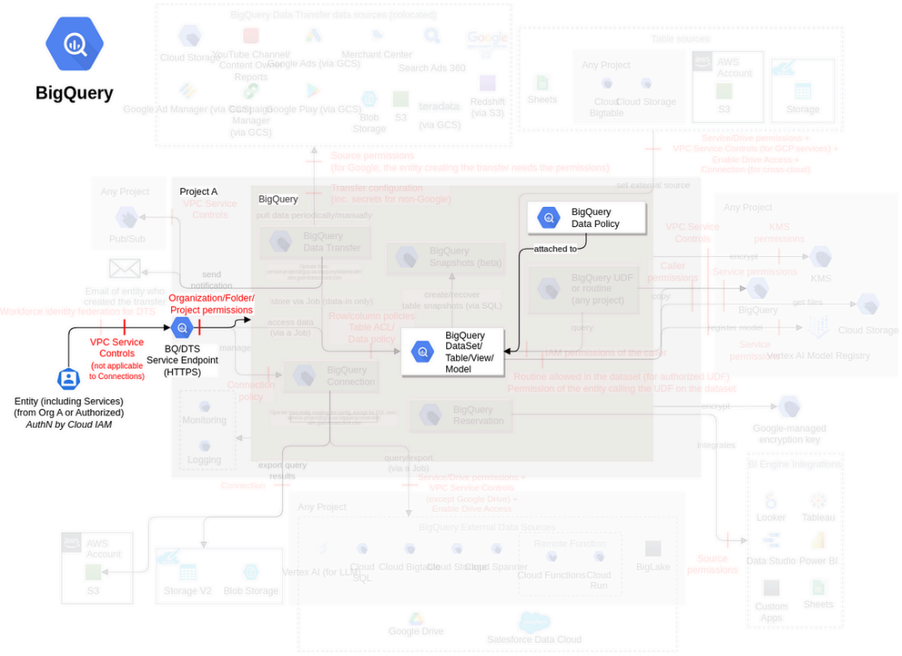
Action	IAM Permission
Creates a new data policy under a project with the given dataPolicyId (used as the display name), policy tag, and data policy type.	bigquery.dataPolicies.create

Threat List

Name	CVSS
Unauthorized access to the table columns by adding or removing policy tags	Low (3.5)

Unauthorized access to the table columns by adding or removing policy tags

Threat Id	Bigquery.T17
Name	Unauthorized access to the table columns by adding or removing policy tags
Description	Policy tags are attached to a column in a BigQuery table to control the visibility of sensitive data to different groups of users. An attacker can create or update a data policy or its data masking rules and associate it with a column by attaching the policy tags associated with the column policy to the column in order to escalate privileges or leak data.
Goal	Launch another attack
MITRE ATT&CK®	TA0004
CVSS	Low (3.5)
IAM Access	{ "AND": [{ "OR": ["bigquery.dataPolicies.create", "bigquery.dataPolicies.update"] }, "datacatalog.taxonomies.get", "bigquery.dataPolicies.setIamPolicy", "bigquery.tables.setCategory", "bigquery.tables.create"] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Restrict access to columns and protect sensitive data Define the criteria to use authorized data policies for each column in each table. Ensure only authorized IAM entities are allowed to access sensitive columns of a table by using data policies.	Medium	2	-	-

Control Implementation

Limit access to the IAM actions required to execute the threats [Bigquery.CO1]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C1] Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	Request the list of authorized IAM members with the permissions required to launch the attack, its review process, and its review records.	High	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6 Bigquery.FC7 Bigquery.FC8	Bigquery.T1 (Very High) Bigquery.T2 (Very High) Bigquery.T3 (Very High) Bigquery.T4 (Very High) Bigquery.T5 (Very High) Bigquery.T6 (Very High) Bigquery.T7 (Very High) Bigquery.T8 (Very High) Bigquery.T9 (Very High) Bigquery.T10 (Very High) Bigquery.T11 (Very High) Bigquery.T12 (Very High) Bigquery.T13 (Very High) Bigquery.T14 (Very High) Bigquery.T15 (Very High) Bigquery.T17 (Very High) Bigquery.T18 (Very High) Bigquery.T19 (Very High) Bigquery.T20 (Very High) Bigquery.T21 (Very High) Bigquery.T22 (Very High) Bigquery.T23 (Very High) Bigquery.T24 (Very High) Bigquery.T25 (Very High) Bigquery.T26 (Very High)	High

Enforce network-level restrictions leveraging VPC origin and VPC Service Controls [Bigquery.CO2]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C2] Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the	Request the process and records of enabling and protecting VPC Service Controls for BigQuery and BigQuery-connected services, using the Compute ThreatModel.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6 Bigquery.FC7	Bigquery.T1 (High) Bigquery.T3 (High) Bigquery.T4 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T7 (High) Bigquery.T8 (High)	Very High

	environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.			Bigquery.FC8	Bigquery.T9 (High) Bigquery.T10 (High) Bigquery.T11 (High) Bigquery.T12 (High) Bigquery.T13 (High) Bigquery.T14 (High) Bigquery.T15 (High) Bigquery.T17 (High) Bigquery.T18 (High) Bigquery.T19 (High) Bigquery.T20 (High) Bigquery.T21 (High) Bigquery.T22 (High) Bigquery.T23 (High) Bigquery.T24 (High) Bigquery.T26 (High)	

Create and secure backups (e.g., by snapshots or exports) of BigQuery dataset(s) and table(s) [Bigquery.CO3]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C3] Define the requirements for the backup of each BigQuery dataset and table.	Request the backup requirements for each BigQuery dataset and table.	Low	Bigquery.FC1 Bigquery.FC7	Bigquery.T1 (Very Low) Bigquery.T14 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C4, depends on Bigquery.C3, assured by Bigquery.C5] Ensure each BigQuery dataset and table is backed up (e.g., by creating snapshots or exports) according to the requirements and is restorable.	Request the mechanism ensuring BigQuery datasets and tables are backed up (e.g., by creating snapshots or exports) according to their requirements, the evidence of their execution, and their regular testing of restoration.	High	Bigquery.FC1 Bigquery.FC7	Bigquery.T1 (High) Bigquery.T14 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C5] Verify all BigQuery datasets and tables are backed up according to their requirements.	Change the backup mechanism to be outside the requirements; it should be detected.	High	Bigquery.FC1 Bigquery.FC7	-	Medium

Control access to tables and views [Bigquery.CO4]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C6] Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns).	Request the list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset, its review process, and its review records.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T3 (Very Low) Bigquery.T5 (Very Low) Bigquery.T6 (Very Low) Bigquery.T8 (Very Low)	High

					Bigquery.T9 (Very Low) Bigquery.T11 (Very Low) Bigquery.T21 (Very Low)	
Directive (COSO) Protect (NIST CSF)	[Bigquery.C7, depends on Bigquery.C6, assured by Bigquery.C8] Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access the tables, views, and table data in a specific dataset, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T8 (High) Bigquery.T9 (High) Bigquery.T11 (High) Bigquery.T21 (Medium)	High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C8] Verify only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	Configure an unauthorized IAM entity to have access to 1) a table or 2) a view; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	High

Restrict access to columns and protect sensitive data [Bigquery.CO5]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C9] Define the criteria for the sensitivity of columns in each table.	Request the criteria for the sensitivity of columns in a table.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T8 (Very Low) Bigquery.T9 (Very Low) Bigquery.T26 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C10, depends on Bigquery.C9, assured by Bigquery.C11] Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive columns of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T8 (Medium) Bigquery.T9 (Medium) Bigquery.T26 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C11] Verify only authorized IAM entities are allowed to access sensitive columns of each table.	Configure an unauthorized IAM entity with access to a sensitive column; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C44] Define the criteria to use authorized data policies for each column in each table.	Request the criteria for using data policies for each column in each table.	Very Low	Bigquery.FC3 Bigquery.FC8	Bigquery.T2 (Very Low) Bigquery.T17 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C45, depends on Bigquery.C44, assured by Bigquery.C46] Ensure only authorized IAM entities are allowed to access sensitive columns of a table by using data policies.	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive columns of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC3 Bigquery.FC8	Bigquery.T2 (Medium) Bigquery.T17 (Medium)	Medium

Assurance (COSO) Detect (NIST CSF)	[Bigquery.C46] Verify only authorized IAM entities are allowed to access sensitive columns of a table.	Configure an unauthorized IAM entity with access to a sensitive column; it should be detected.	Low	Bigquery.FC3 Bigquery.FC8	-	Medium

Restrict access to rows with BigQuery row-level security [Bigquery.CO6]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C12] Define the criteria for the sensitivity of rows in each table.	Request the criteria for the sensitivity of rows in a table.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T8 (Very Low) Bigquery.T9 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C13, depends on Bigquery.C12, assured by Bigquery.C14] Ensure only authorized IAM entities are allowed to access sensitive rows of a table (e.g., using BigQuery row-level security).	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive rows of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Medium) Bigquery.T8 (Medium) Bigquery.T9 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C14] Verify only authorized IAM entities are allowed to access sensitive rows of a table.	Configure an unauthorized IAM entity with access to a sensitive row; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	Medium

Encrypt datasets and models at rest, and protect the keys [Bigquery.CO7]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C26] Maintain a list of authorized CMEKs to be used with each BigQuery dataset and model, ideally dedicated.	Request the list of authorized CMEKs to be used by the BigQuery dataset and model, its review process, and its review records.	Very Low	Bigquery.FC1	Bigquery.T3 (Very Low) Bigquery.T11 (Very Low) Bigquery.T20 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C27, depends on Bigquery.C26, assured by Bigquery.C29] Ensure only authorized CMEKs are used with each BigQuery dataset and model (e.g., using default configuration), and any unauthorized CMEKs are restricted following the Cloud KMS ThreatModel.	Request 1) the mechanism ensuring only authorized CMEKs are configured, 2) its records of execution for all new CMEKs, 3) the plan to move any older CMEKs, 4) the mechanism ensuring unauthorized CMEKs are restricted, and its records of execution.	Medium	Bigquery.FC1	Bigquery.T11 (Medium) Bigquery.T20 (Medium)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C28, depends on Bigquery.C26] Protect the CMEKs used by BigQuery datasets and models, using the Cloud KMS ThreatModel.	Request how the Cloud KMS ThreatModel is applied to BigQuery datasets and models.	High	Bigquery.FC1	Bigquery.T3 (Medium) Bigquery.T11 (Medium) Bigquery.T20 (Medium)	Low
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C29] Verify each BigQuery dataset and each model are encrypted using an authorized CMEK.	Use unauthorized CMEK with a BigQuery dataset or model; it should be detected.	Low	Bigquery.FC1	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C36, depends on Bigquery.C26, assured by Bigquery.C37] Ensure AEAD encryption functions are used to encrypt data at the column level.	Request the mechanism ensuring AEAD encryption functions are used to encrypt data at the column level.	Medium	Bigquery.FC1	Bigquery.T11 (Medium)	Medium

Assurance (COSO) Detect (NIST CSF)	[Bigquery.C37] Verify AEAD encryption functions are used to encrypt data at the column level.	Do not encrypt the data at the column level; it should be detected.	Low	Bigquery.FC1	-	Medium

Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs [Bigquery.CO8]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C15, assured by Bigquery.C16] Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed.	Request 1) the mechanism ensuring no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", 2) its records of execution for all datasets, and 3) the plan to move any older datasets.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T9 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C16] Verify no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers" (e.g., using the Security Command Center finding PUBLIC_DATASET).	Modify a dataset to allow access to 1) "AllUsers", or 2) "AllAuthenticatedUsers"; it should be detected.	Very Low	Bigquery.FC1 Bigquery.FC2	-	Very High
Directive (COSO) Identify (NIST CSF)	[Bigquery.C17] Define the authorized configuration (i.e., defaultTableExpirationMs, defaultPartitionExpirationMs, access[], defaultEncryptionConfiguration, linkedDatasetSource, externalDatasetReference, defaultCollation, defaultRoundingMode, maxTimeTravelHours, storageBillingModel, and defaultEncryptionConfiguration) for each BigQuery dataset.	Request the authorized configuration for each BigQuery dataset, its review process, and its review records.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (Very Low) Bigquery.T11 (Very Low) Bigquery.T21 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C18, depends on Bigquery.C17, assured by Bigquery.C19] Ensure the configuration of each BigQuery dataset is authorized.	Request the mechanism ensuring the configuration of each BigQuery dataset is authorized, and the evidence of its execution.	High	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T11 (High) Bigquery.T21 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C19] Verify all BigQuery datasets have authorized configurations.	Create a dataset with an unauthorized configuration; it should be detected.	High	Bigquery.FC1 Bigquery.FC2	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C60] Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType).	Request the authorized configuration for each reservation and its assignments.	Low	Bigquery.FC1 Bigquery.FC5	Bigquery.T9 (Very Low) Bigquery.T12 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C61, depends on Bigquery.C60, assured by Bigquery.C62] Ensure each reservation and its assignments use an authorized configuration.	Request the mechanism ensuring the reservation and its assignments use an authorized configuration and the evidence of its execution.	High	Bigquery.FC5	Bigquery.T12 (High)	Medium

Assurance (COSO) Detect (NIST CSF)	[Bigquery.C62] Verify all reservations and their assignments use an authorized configuration.	Use an unauthorized configuration with 1) a reservation, or 2) an assignment; it should be detected.	High	Bigquery.FC5	-	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C63, depends on Bigquery.C60] Monitor the creation/modification of unauthorized reservation (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and "google.cloud.bigquery.reservation.v1.ReservationService.UpdateReservation", and their fields request.reservation.autoscale.maxSlots and request.reservation.edition).	Create/update the reservation with unauthorized values; it should be detected.	Medium	Bigquery.FC5	Bigquery.T12 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C64, depends on Bigquery.C60] Monitor the creation of unauthorized assignment (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and its fields request.assignment.assignee, request.assignment.jobType, and request.parent).	Create the assignment with unauthorized values; it should be detected.	Medium	Bigquery.FC5	Bigquery.T12 (Medium)	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C75] Define the authorized configuration (e.g., createDisposition, writeDisposition, schemaUpdateOptions) for each asynchronous query job.	Request the authorized configuration for each asynchronous query job, its review process, and its review records.	Low	Bigquery.FC1	Bigquery.T20 (Very Low)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C76, depends on Bigquery.C75, assured by Bigquery.C77] Ensure the configuration of each asynchronous query job is authorized.	Request the mechanism ensuring the configuration of each asynchronous query job is authorized, and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T20 (Medium)	Low
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C77] Verify all asynchronous query jobs have authorized configurations.	Create an asynchronous query job with unauthorized configurations; it should be detected.	High	Bigquery.FC1	-	Low
Directive (COSO) Identify (NIST CSF)	[Bigquery.C81] Define the authorized configuration (i.e., schema, clustering, expirationTime, view, materializedView, externalDataConfiguration, encryptionConfiguration, defaultCollation, defaultRoundingMode, and tableConstraints) for each BigQuery table.	Request the authorized configuration for each BigQuery table, its review process, and its review records.	Medium	Bigquery.FC1	Bigquery.T25 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C82, depends on Bigquery.C81, assured by Bigquery.C83] Ensure the configuration of each BigQuery table is authorized.	Request the mechanism ensuring the configuration of each BigQuery table is authorized, and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T25 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C83] Verify all BigQuery tables have authorized configurations.	Create a table with an unauthorized configuration; it should be detected.	High	Bigquery.FC1	-	Medium

De-identify sensitive data using Cloud DLP [Bigquery.CO9]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C20, assured by Bigquery.C21] Ensure sensitive data is identified and redacted (e.g., using Cloud DLP).	Request the mechanism to identify and redact sensitive data.	High	Bigquery.FC1	Bigquery.T6 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C21] Verify sensitive data is identified and redacted (e.g., using Cloud DLP).	Do not identify and redact sensitive data; it should be detected.	High	Bigquery.FC1	-	Medium

Secure the authorized sources and destinations used with tables, models, and connections [Bigquery.CO10]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C22] Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection.	Request the list of all authorized sources and destinations to be used with each table, model, and connection.	High	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	Bigquery.T2 (Very Low) Bigquery.T3 (Very Low) Bigquery.T15 (Very Low) Bigquery.T20 (Very Low) Bigquery.T23 (Very Low) Bigquery.T24 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C23, depends on Bigquery.C22, assured by Bigquery.C24] Ensure each table, model, and connection uses authorized sources and destinations.	Request 1) the mechanism ensuring only authorized sources and destinations are configured, 2) its records of execution for all new sources and destinations, and 3) the plan to move any older sources and destinations.	Medium	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T15 (High) Bigquery.T20 (High) Bigquery.T23 (High) Bigquery.T24 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C24] Verify each table, model, and connection use authorized sources and destinations.	For a BigQuery table, model, and/or connection, use an unauthorized 1) source and 2) destination; it should be detected.	Medium	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C25, depends on Bigquery.C22] Protect the sources and destinations used for infiltration/exfiltration with each table and connection, using their respective services' ThreatModel.	Request how the respective source and destination ThreatModel are applied to BigQuery.	High	Bigquery.FC1 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T15 (High)	Medium

Set the quotas on BigQuery as per the API usage statistics [Bigquery.CO11]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority

Directive (COSO) Protect (NIST CSF)	[Bigquery.C30, assured by Bigquery.C31] Ensure the quotas on BigQuery (e.g., query limits, streaming insert limits, etc.) are set as per the API usage statistics.	Request the mechanism to ensure the quotas on BigQuery (e.g., query limits, streaming insert limits, etc.) are set as per the API usage statistics.	High	Bigquery.FC1	Bigquery.T7 (High)	Very Low
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C31] Verify the quotas on BigQuery are set as per the API usage statistics.	Do not set the quotas on BigQuery as per the API usage statistics; it should be detected.	High	Bigquery.FC1	-	Very Low

Set the expiration time of BigQuery tables as per the requirements [Bigquery.CO12]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C32] Define the requirements for the expiration time of each BigQuery table.	Request the requirement for the expiration time of each BigQuery table.	Low	Bigquery.FC1	Bigquery.T11 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C33, depends on Bigquery.C32, assured by Bigquery.C34] Ensure the expiration time of each BigQuery table is set according to its requirements.	Request the mechanism ensuring the expiration time of each BigQuery table is set according to its requirements.	Medium	Bigquery.FC1	Bigquery.T11 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C34] Verify the expiration time of each BigQuery table is set to its requirements.	Set the expiration time of a BigQuery table to be outside its requirements; it should be detected.	High	Bigquery.FC1	-	Medium

Monitor BigQuery capacity and utilization [Bigquery.CO13]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Detective (COSO) Detect (NIST CSF)	[Bigquery.C35] Monitor slot consumption (e.g., using slot recommender), job concurrency, job execution time, job errors, and bytes processed across the entire organization (e.g., using BigQuery Admin Resource Charts).	Stop a job using slots; it should be detected.	Low	Bigquery.FC5	Bigquery.T12 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C43] Monitor slot capacity (e.g., using slot estimator) to estimate the correct number of slots for the BigQuery workload.	Stop unnecessary slots; it should be detected.	Low	Bigquery.FC5	Bigquery.T12 (Low)	Low

Limit usage of BigQuery Omni [Bigquery.CO14]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority

Directive (COSO) Identify (NIST CSF)	[Bigquery.C38] Define the requirements for using BigQuery Omni (AWS and/or Azure).	Request the requirement for the usage of BigQuery Omni.	Low	Bigquery.FC3	Bigquery.T15 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C39, depends on Bigquery.C38, assured by Bigquery.C40] Ensure the usage of BigQuery Omni as per the requirements (e.g., using organizational constraint constraints/bigquery.disableBQOmniAWS and constraints/bigquery.disableBQOmniAzure).	Request the implementation to ensure the usage of BigQuery Omni as per the requirements, and its records of execution.	Medium	Bigquery.FC3	Bigquery.T15 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C40] Verify the usage of BigQuery Omni as per the requirements.	Use BigQuery Omni outside the requirement; it should be detected.	Low	Bigquery.FC3	-	High

Enable logs for BigQuery Data Transfer [Bigquery.CO15]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C41] Ensure Cloud Audit logs for BigQuery Data Transfer are enabled (ref).	Request the implementation for enabling the Cloud Audit logs for BigQuery Data Transfer and its records for execution.	Medium	Bigquery.FC4	Bigquery.T13 (Low)	Low

Monitor data ingestion and data quality [Bigquery.CO16]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Detective (COSO) Detect (NIST CSF)	[Bigquery.C42] Monitor the abnormal number of concurrent connections and throughput for the BigQuery table (e.g., by using the Monitoring metric CONSUMER QUOTA - QUOTA LIMIT).	Ingest a large amount of data into a BigQuery table; it should be detected.	Low	Bigquery.FC1 Bigquery.FC6	Bigquery.T4 (Low) Bigquery.T5 (Very Low)	Low
Detective (COSO) Detect (NIST CSF)	[Bigquery.C65] Monitor the quality of data used with the ML models (e.g., by data profiling).	Ingest bogus data in a table; it should be detected.	Low	Bigquery.FC6	Bigquery.T4 (Low)	Low

Register BigQuery models as per the requirements [Bigquery.CO17]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C47]	Request the registration requirements for each BigQuery model.	Low	Bigquery.FC6	Bigquery.T18 (Very Low)	Medium

	Define the requirements to register the BigQuery models with the Vertex AI Model Registry for each BigQuery model.					
Directive (COSO) Protect (NIST CSF)	[Bigquery.C48, depends on Bigquery.C47, assured by Bigquery.C49] Ensure each BigQuery model is registered with the Vertex AI Model Registry according to its requirement.	Request the mechanism ensuring the BigQuery model is registered according to its requirements, and the evidence of its execution.	High	Bigquery.FC6	Bigquery.T18 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C49] Verify all BigQuery models are registered with the Vertex AI Model Registry according to their requirements.	Register a model with a Vertex AI Model Registry outside the requirements; it should be detected.	High	Bigquery.FC6	-	Medium

Limit the amount of cloned data [Bigquery.CO18]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C50] Define the requirements for setting the time travel of each BigQuery dataset.	Request the requirement for setting the time travel of each BigQuery dataset.	Low	Bigquery.FC1	Bigquery.T19 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C51, depends on Bigquery.C50, assured by Bigquery.C52] Ensure the time travel of each BigQuery dataset is set according to its requirements.	Request the mechanism ensuring the time travel of each BigQuery dataset is set according to its requirements.	Medium	Bigquery.FC1	Bigquery.T19 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C52] Verify the time travel of each BigQuery dataset is set to its requirements.	Set the time travel of a BigQuery dataset to an unauthorized value; it should be detected.	High	Bigquery.FC1	-	Medium

Ensure authorized configuration(s) are used with jobs [Bigquery.CO19]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C53] Define the authorized configuration for each job.	Request the authorized configuration for each job, its review process, and its review records.	Low	Bigquery.FC1	Bigquery.T19 (Very Low) Bigquery.T26 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C54, depends on Bigquery.C53, assured by Bigquery.C55] Ensure each job uses an authorized configuration.	Request the mechanism ensuring the job uses an authorized configuration and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T19 (High) Bigquery.T26 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C55] Verify all jobs use an authorized configuration.	Use an unauthorized configuration with a job; it should be detected.	High	Bigquery.FC1	-	Medium

Monitor abnormal performance of queries [Bigquery.CO20]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Detective (COSO) Detect (NIST CSF)	[Bigquery.C56] Monitor the abnormal behavior of a query (e.g., by using the query execution graph).	Run a query with abnormal behavior; it should be detected.	Low	Bigquery.FC1	Bigquery.T9 (Medium)	Medium

Use authorized metadata caching [Bigquery.CO21]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C57] Define the requirements for metadata cache mode and staleness (30 minutes to 7 days) for each external table.	Request the requirement for enabling metadata cache and setting its staleness (30 minutes - 7 days) for each external table.	Low	Bigquery.FC1	Bigquery.T9 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C58, depends on Bigquery.C57, assured by Bigquery.C59] Ensure the metadata cache mode and staleness of each external table are set according to their requirements.	Request the mechanism ensuring the metadata cache mode and staleness of each external table are set according to their requirements.	Medium	Bigquery.FC1	Bigquery.T9 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C59] Verify the metadata cache mode and staleness of each external table are set to their requirements.	Set the metadata cache mode and staleness of an external table outside the requirements; it should be detected.	Medium	Bigquery.FC1	-	Medium

Secure and use the authorized sources and their respective authorized configurations with BigQuery Data Transfer [Bigquery.CO22]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C66] Maintain a list of authorized sources (e.g., Cloud Storage, Amazon S3, etc.) and their respective authorized configurations to be used with each transfer.	Request the list of all authorized sources and their respective authorized configurations to be used with each transfer, its review process, and its review records.	Low	Bigquery.FC4	Bigquery.T13 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C67, depends on Bigquery.C66, assured by Bigquery.C68] Ensure each transfer uses an authorized source and its authorized configuration.	Request 1) the mechanism ensuring only an authorized source and its authorized configuration is configured, 2) its records of execution for all new sources, and 3) the plan to move any older sources.	Medium	Bigquery.FC4	Bigquery.T13 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C68] Verify each transfer uses an authorized source and its authorized configuration.	For a transfer, 1) use an unauthorized source, 2) remove an authorized source, or 3) use an unauthorized configuration for a source; it should be detected.	Medium	Bigquery.FC4	-	Medium

Directive (COSO) Protect (NIST CSF)	[Bigquery.C69, depends on Bigquery.C66] Protect the sources used with each transfer, using the respective service's ThreatModel.	Request how the respective service ThreatModel is applied to protect each BigQuery Data Transfer source.	High	Bigquery.FC4	Bigquery.T13 (Medium)	Low

Use authorized User-Defined Functions [Bigquery.CO23]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C70] Maintain a list of authorized Cloud Storage buckets to be used with query jobs for User-Defined Functions (UDFs).	Request the list of Cloud Storage buckets used with query jobs for User-Defined Functions (UDFs).	High	Bigquery.FC1	Bigquery.T20 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C71, depends on Bigquery.C70, assured by Bigquery.C72] Ensure each query uses an authorized Cloud Storage bucket for a UDF.	Request 1) the mechanism ensuring only authorized Cloud Storage bucket is configured, 2) its records of execution for all new Cloud Storage buckets, and 3) the plan to move any older Cloud Storage buckets.	Medium	Bigquery.FC1	Bigquery.T20 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C72] Verify each query uses an authorized Cloud Storage bucket for a UDF.	For a UDF, use an unauthorized bucket; it should be detected.	Medium	Bigquery.FC1	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C73, depends on Bigquery.C70] Protect the Cloud Storage buckets used for storing UDFs, using Cloud Storage ThreatModel.	Request how the Cloud Storage ThreatModel is applied to buckets used for storing UDFs.	High	Bigquery.FC1	Bigquery.T20 (Medium)	Low

Enforce SDLC process on User-Defined Functions [Bigquery.CO24]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C74] Enforce secure SDLC process on User-Defined Functions (e.g., using source control, static analysis, dynamic analysis, peer review).	Request the process and records of enforcing the SDLC process on UDFs to ensure reviews of their code.	Medium	Bigquery.FC1	Bigquery.T20 (High)	Medium

Set an authorized expiration time for each ML model [Bigquery.CO25]

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Identify (NIST CSF)	[Bigquery.C78] Define the authorized expiration time for each ML model.	Request the authorized expiration time for each ML model.	Low	Bigquery.FC6	Bigquery.T22 (Very Low)	Medium

Directive (COSO) Protect (NIST CSF)	[Bigquery.C79, depends on Bigquery.C78, assured by Bigquery.C80] Ensure the expiration time for each ML model is authorized.	Request the mechanism ensuring the expiration time for each ML model is authorized, and the evidence of its execution.	High	Bigquery.FC6	Bigquery.T22 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C80] Verify all ML models have an authorized expiration time.	Create an ML model. With unauthorized expiration time; it should be detected.	High	Bigquery.FC6	-	Medium

Appendixes

Appendix 1 - Prioritized list for control implementation

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C2] Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Request the process and records of enabling and protecting VPC Service Controls for BigQuery and BigQuery-connected services, using the Compute ThreatModel.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6 Bigquery.FC7 Bigquery.FC8	Bigquery.T1 (High) Bigquery.T3 (High) Bigquery.T4 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T7 (High) Bigquery.T8 (High) Bigquery.T9 (High) Bigquery.T10 (High) Bigquery.T11 (High) Bigquery.T12 (High) Bigquery.T13 (High) Bigquery.T14 (High) Bigquery.T15 (High) Bigquery.T17 (High) Bigquery.T18 (High) Bigquery.T19 (High) Bigquery.T20 (High) Bigquery.T21 (High) Bigquery.T22 (High) Bigquery.T23 (High) Bigquery.T24 (High) Bigquery.T26 (High)	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C15, assured by Bigquery.C16] Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed.	Request 1) the mechanism ensuring no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", 2) its records of execution for all datasets, and 3) the plan to move any older datasets.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T9 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C16] Verify no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers" (e.g., using the Security Command Center finding PUBLIC_DATASET).	Modify a dataset to allow access to 1) "AllUsers", or 2) "AllAuthenticatedUsers"; it should be detected.	Very Low	Bigquery.FC1 Bigquery.FC2	-	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C1] Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	Request the list of authorized IAM members with the permissions required to launch the attack, its review process, and its review records.	High	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6	Bigquery.T1 (Very High) Bigquery.T2 (Very High) Bigquery.T3 (Very High) Bigquery.T4 (Very High) Bigquery.T5 (Very High) Bigquery.T6 (Very High)	High

				Bigquery.FC7 Bigquery.FC8	Bigquery.T7 (Very High) Bigquery.T8 (Very High) Bigquery.T9 (Very High) Bigquery.T10 (Very High) Bigquery.T11 (Very High) Bigquery.T12 (Very High) Bigquery.T13 (Very High) Bigquery.T14 (Very High) Bigquery.T15 (Very High) Bigquery.T17 (Very High) Bigquery.T18 (Very High) Bigquery.T19 (Very High) Bigquery.T20 (Very High) Bigquery.T21 (Very High) Bigquery.T22 (Very High) Bigquery.T23 (Very High) Bigquery.T24 (Very High) Bigquery.T25 (Very High) Bigquery.T26 (Very High)	
Directive (COSO) Identify (NIST CSF)	[Bigquery.C6] Maintain a list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset (note: columns can be made case-sensitive, and a default value can be set for the columns).	Request the list of authorized IAM entities allowed to access the tables, views, and table data in a specific dataset, its review process, and its review records.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T3 (Very Low) Bigquery.T5 (Very Low) Bigquery.T6 (Very Low) Bigquery.T8 (Very Low) Bigquery.T9 (Very Low) Bigquery.T11 (Very Low) Bigquery.T21 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C7, depends on Bigquery.C6, assured by Bigquery.C8] Ensure only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access the tables, views, and table data in a specific dataset, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T8 (High) Bigquery.T9 (High) Bigquery.T11 (High) Bigquery.T21 (Medium)	High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C8] Verify only authorized IAM entities are allowed to access the tables, views, and table data in each dataset.	Configure an unauthorized IAM entity to have access to 1) a table or 2) a view; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	High
Directive (COSO) Identify (NIST CSF)	[Bigquery.C9] Define the criteria for the sensitivity of columns in each table.	Request the criteria for the sensitivity of columns in a table.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T8 (Very Low) Bigquery.T9 (Very Low) Bigquery.T26 (Very Low)	High

Directive (COSO) Identify (NIST CSF)	[Bigquery.C38] Define the requirements for using BigQuery Omni (AWS and/or Azure).	Request the requirement for the usage of BigQuery Omni.	Low	Bigquery.FC3	Bigquery.T15 (Very Low)	High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C39, depends on Bigquery.C38, assured by Bigquery.C40] Ensure the usage of BigQuery Omni as per the requirements (e.g., using organizational constraint constraints/bigquery.disableBQOmniAWS and constraints/bigquery.disableBQOmniAzure).	Request the implementation to ensure the usage of BigQuery Omni as per the requirements, and its records of execution.	Medium	Bigquery.FC3	Bigquery.T15 (Very High)	High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C40] Verify the usage of BigQuery Omni as per the requirements.	Use BigQuery Omni outside the requirement; it should be detected.	Low	Bigquery.FC3	-	High
Directive (COSO) Identify (NIST CSF)	[Bigquery.C3] Define the requirements for the backup of each BigQuery dataset and table.	Request the backup requirements for each BigQuery dataset and table.	Low	Bigquery.FC1 Bigquery.FC7	Bigquery.T1 (Very Low) Bigquery.T14 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C4, depends on Bigquery.C3, assured by Bigquery.C5] Ensure each BigQuery dataset and table is backed up (e.g., by creating snapshots or exports) according to the requirements and is restorable.	Request the mechanism ensuring BigQuery datasets and tables are backed up (e.g., by creating snapshots or exports) according to their requirements, the evidence of their execution, and their regular testing of restoration.	High	Bigquery.FC1 Bigquery.FC7	Bigquery.T1 (High) Bigquery.T14 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C5] Verify all BigQuery datasets and tables are backed up according to their requirements.	Change the backup mechanism to be outside the requirements; it should be detected.	High	Bigquery.FC1 Bigquery.FC7	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C10, depends on Bigquery.C9, assured by Bigquery.C11] Ensure only authorized IAM entities are allowed to access sensitive columns of a table (e.g., using BigQuery column-level security, column-level data masking, custom masking routines, restriction analysis rule, list overlap analysis rule, aggregation threshold analysis rule, differential privacy clause, or data clean rooms).	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive columns of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T8 (Medium) Bigquery.T9 (Medium) Bigquery.T26 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C11] Verify only authorized IAM entities are allowed to access sensitive columns of each table.	Configure an unauthorized IAM entity with access to a sensitive column; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C44] Define the criteria to use authorized data policies for each column in each table.	Request the criteria for using data policies for each column in each table.	Very Low	Bigquery.FC3 Bigquery.FC8	Bigquery.T2 (Very Low) Bigquery.T17 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C45, depends on Bigquery.C44, assured by Bigquery.C46] Ensure only authorized IAM entities are allowed to access sensitive columns of a table by using data policies.	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive columns of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC3 Bigquery.FC8	Bigquery.T2 (Medium) Bigquery.T17 (Medium)	Medium

Assurance (COSO) Detect (NIST CSF)	[Bigquery.C46] Verify only authorized IAM entities are allowed to access sensitive columns of a table.	Configure an unauthorized IAM entity with access to a sensitive column; it should be detected.	Low	Bigquery.FC3 Bigquery.FC8	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C12] Define the criteria for the sensitivity of rows in each table.	Request the criteria for the sensitivity of rows in a table.	Very Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Very Low) Bigquery.T8 (Very Low) Bigquery.T9 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C13, depends on Bigquery.C12, assured by Bigquery.C14] Ensure only authorized IAM entities are allowed to access sensitive rows of a table (e.g., using BigQuery row-level security).	Request 1) the mechanism ensuring only authorized IAM entities are allowed to access sensitive rows of a table, 2) its records of execution for all new IAM entities, and 3) the plan to move any older IAM entities.	Medium	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	Bigquery.T2 (Medium) Bigquery.T8 (Medium) Bigquery.T9 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C14] Verify only authorized IAM entities are allowed to access sensitive rows of a table.	Configure an unauthorized IAM entity with access to a sensitive row; it should be detected.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C26] Maintain a list of authorized CMEKs to be used with each BigQuery dataset and model, ideally dedicated.	Request the list of authorized CMEKs to be used by the BigQuery dataset and model, its review process, and its review records.	Very Low	Bigquery.FC1	Bigquery.T3 (Very Low) Bigquery.T11 (Very Low) Bigquery.T20 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C27, depends on Bigquery.C26, assured by Bigquery.C29] Ensure only authorized CMEKs are used with each BigQuery dataset and model (e.g., using default configuration), and any unauthorized CMEKs are restricted following the Cloud KMS ThreatModel.	Request 1) the mechanism ensuring only authorized CMEKs are configured, 2) its records of execution for all new CMEKs, 3) the plan to move any older CMEKs, 4) the mechanism ensuring unauthorized CMEKs are restricted, and its records of execution.	Medium	Bigquery.FC1	Bigquery.T11 (Medium) Bigquery.T20 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C29] Verify each BigQuery dataset and each model are encrypted using an authorized CMEK.	Use unauthorized CMEK with a BigQuery dataset or model; it should be detected.	Low	Bigquery.FC1	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C36, depends on Bigquery.C26, assured by Bigquery.C37] Ensure AEAD encryption functions are used to encrypt data at the column level.	Request the mechanism ensuring AEAD encryption functions are used to encrypt data at the column level.	Medium	Bigquery.FC1	Bigquery.T11 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C37] Verify AEAD encryption functions are used to encrypt data at the column level.	Do not encrypt the data at the column level; it should be detected.	Low	Bigquery.FC1	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C17] Define the authorized configuration (i.e., defaultTableExpirationMs, defaultPartitionExpirationMs, access[], defaultEncryptionConfiguration, linkedDatasetSource, externalDatasetReference, defaultCollation, defaultRoundingMode, maxTimeTravelHours, storageBillingModel, and defaultEncryptionConfiguration) for each BigQuery dataset.	Request the authorized configuration for each BigQuery dataset, its review process, and its review records.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (Very Low) Bigquery.T11 (Very Low) Bigquery.T21 (Very Low)	Medium

Directive (COSO) Protect (NIST CSF)	[Bigquery.C18, depends on Bigquery.C17, assured by Bigquery.C19] Ensure the configuration of each BigQuery dataset is authorized.	Request the mechanism ensuring the configuration of each BigQuery dataset is authorized, and the evidence of its execution.	High	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T11 (High) Bigquery.T21 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C19] Verify all BigQuery datasets have authorized configurations.	Create a dataset with an unauthorized configuration; it should be detected.	High	Bigquery.FC1 Bigquery.FC2	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C60] Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType).	Request the authorized configuration for each reservation and its assignments.	Low	Bigquery.FC1 Bigquery.FC5	Bigquery.T9 (Very Low) Bigquery.T12 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C61, depends on Bigquery.C60, assured by Bigquery.C62] Ensure each reservation and its assignments use an authorized configuration.	Request the mechanism ensuring the reservation and its assignments use an authorized configuration and the evidence of its execution.	High	Bigquery.FC5	Bigquery.T12 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C62] Verify all reservations and their assignments use an authorized configuration.	Use an unauthorized configuration with 1) a reservation, or 2) an assignment; it should be detected.	High	Bigquery.FC5	-	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C63, depends on Bigquery.C60] Monitor the creation/modification of unauthorized reservation (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and "google.cloud.bigquery.reservation.v1.ReservationService.UpdateReservation", and their fields request.reservation.autoscale.maxSlots and request.reservation.edition).	Create/update the reservation with unauthorized values; it should be detected.	Medium	Bigquery.FC5	Bigquery.T12 (Medium)	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C64, depends on Bigquery.C60] Monitor the creation of unauthorized assignment (e.g., by using Cloud Logging method "google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment" and its fields request.assignment.assignee, request.assignment.jobType, and request.parent).	Create the assignment with unauthorized values; it should be detected.	Medium	Bigquery.FC5	Bigquery.T12 (Medium)	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C81] Define the authorized configuration (i.e., schema, clustering, expirationTime, view, materializedView, externalDataConfiguration, encryptionConfiguration, defaultCollation, defaultRoundingMode, and tableConstraints) for each BigQuery table.	Request the authorized configuration for each BigQuery table, its review process, and its review records.	Medium	Bigquery.FC1	Bigquery.T25 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C82, depends on Bigquery.C81, assured by Bigquery.C83] Ensure the configuration of each BigQuery table is authorized.	Request the mechanism ensuring the configuration of each BigQuery table is authorized, and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T25 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C83]	Create a table with an unauthorized configuration; it should be detected.	High	Bigquery.FC1	-	Medium

	Verify all BigQuery tables have authorized configurations.					
Directive (COSO) Protect (NIST CSF)	[Bigquery.C20, assured by Bigquery.C21] Ensure sensitive data is identified and redacted (e.g., using Cloud DLP).	Request the mechanism to identify and redact sensitive data.	High	Bigquery.FC1	Bigquery.T6 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C21] Verify sensitive data is identified and redacted (e.g., using Cloud DLP).	Do not identify and redact sensitive data; it should be detected.	High	Bigquery.FC1	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C22] Maintain a list of authorized sources and destinations (e.g., Cloud Storage, BigQuery, Vertex AI (for LLM, via BigQuery connection only)) to be used with each table, model, and connection.	Request the list of all authorized sources and destinations to be used with each table, model, and connection.	High	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	Bigquery.T2 (Very Low) Bigquery.T3 (Very Low) Bigquery.T15 (Very Low) Bigquery.T20 (Very Low) Bigquery.T23 (Very Low) Bigquery.T24 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C23, depends on Bigquery.C22, assured by Bigquery.C24] Ensure each table, model, and connection uses authorized sources and destinations.	Request 1) the mechanism ensuring only authorized sources and destinations are configured, 2) its records of execution for all new sources and destinations, and 3) the plan to move any older sources and destinations.	Medium	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T15 (High) Bigquery.T20 (High) Bigquery.T23 (High) Bigquery.T24 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C24] Verify each table, model, and connection use authorized sources and destinations.	For a BigQuery table, model, and/or connection, use an unauthorized 1) source and 2) destination; it should be detected.	Medium	Bigquery.FC1 Bigquery.FC3 Bigquery.FC6	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C25, depends on Bigquery.C22] Protect the sources and destinations used for infiltration/exfiltration with each table and connection, using their respective services' ThreatModel.	Request how the respective source and destination ThreatModel are applied to BigQuery.	High	Bigquery.FC1 Bigquery.FC3	Bigquery.T2 (High) Bigquery.T3 (High) Bigquery.T15 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C32] Define the requirements for the expiration time of each BigQuery table.	Request the requirement for the expiration time of each BigQuery table.	Low	Bigquery.FC1	Bigquery.T11 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C33, depends on Bigquery.C32, assured by Bigquery.C34] Ensure the expiration time of each BigQuery table is set according to its requirements.	Request the mechanism ensuring the expiration time of each BigQuery table is set according to its requirements.	Medium	Bigquery.FC1	Bigquery.T11 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C34] Verify the expiration time of each BigQuery table is set to its requirements.	Set the expiration time of a BigQuery table to be outside its requirements; it should be detected.	High	Bigquery.FC1	-	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C35] Monitor slot consumption (e.g., using slot recommender), job concurrency, job execution time, job errors, and bytes processed across the entire organization (e.g., using BigQuery Admin Resource Charts).	Stop a job using slots; it should be detected.	Low	Bigquery.FC5	Bigquery.T12 (Medium)	Medium

Directive (COSO) Identify (NIST CSF)	[Bigquery.C47] Define the requirements to register the BigQuery models with the Vertex AI Model Registry for each BigQuery model.	Request the registration requirements for each BigQuery model.	Low	Bigquery.FC6	Bigquery.T18 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C48, depends on Bigquery.C47, assured by Bigquery.C49] Ensure each BigQuery model is registered with the Vertex AI Model Registry according to its requirement.	Request the mechanism ensuring the BigQuery model is registered according to its requirements, and the evidence of its execution.	High	Bigquery.FC6	Bigquery.T18 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C49] Verify all BigQuery models are registered with the Vertex AI Model Registry according to their requirements.	Register a model with a Vertex AI Model Registry outside the requirements; it should be detected.	High	Bigquery.FC6	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C50] Define the requirements for setting the time travel of each BigQuery dataset.	Request the requirement for setting the time travel of each BigQuery dataset.	Low	Bigquery.FC1	Bigquery.T19 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C51, depends on Bigquery.C50, assured by Bigquery.C52] Ensure the time travel of each BigQuery dataset is set according to its requirements.	Request the mechanism ensuring the time travel of each BigQuery dataset is set according to its requirements.	Medium	Bigquery.FC1	Bigquery.T19 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C52] Verify the time travel of each BigQuery dataset is set to its requirements.	Set the time travel of a BigQuery dataset to an unauthorized value; it should be detected.	High	Bigquery.FC1	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C53] Define the authorized configuration for each job.	Request the authorized configuration for each job, its review process, and its review records.	Low	Bigquery.FC1	Bigquery.T19 (Very Low) Bigquery.T26 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C54, depends on Bigquery.C53, assured by Bigquery.C55] Ensure each job uses an authorized configuration.	Request the mechanism ensuring the job uses an authorized configuration and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T19 (High) Bigquery.T26 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C55] Verify all jobs use an authorized configuration.	Use an unauthorized configuration with a job; it should be detected.	High	Bigquery.FC1	-	Medium
Detective (COSO) Detect (NIST CSF)	[Bigquery.C56] Monitor the abnormal behavior of a query (e.g., by using the query execution graph).	Run a query with abnormal behavior; it should be detected.	Low	Bigquery.FC1	Bigquery.T9 (Medium)	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C57] Define the requirements for metadata cache mode and staleness (30 minutes to 7 days) for each external table.	Request the requirement for enabling metadata cache and setting its staleness (30 minutes - 7 days) for each external table.	Low	Bigquery.FC1	Bigquery.T9 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C58, depends on Bigquery.C57, assured by Bigquery.C59] Ensure the metadata cache mode and staleness of each external table are set according to their requirements.	Request the mechanism ensuring the metadata cache mode and staleness of each external table are set according to their requirements.	Medium	Bigquery.FC1	Bigquery.T9 (Medium)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C59] Verify the metadata cache mode and staleness of each external table are set to their requirements.	Set the metadata cache mode and staleness of an external table outside the requirements; it should be detected.	Medium	Bigquery.FC1	-	Medium

Directive (COSO) Identify (NIST CSF)	[Bigquery.C66] Maintain a list of authorized sources (e.g., Cloud Storage, Amazon S3, etc.) and their respective authorized configurations to be used with each transfer.	Request the list of all authorized sources and their respective authorized configurations to be used with each transfer, its review process, and its review records.	Low	Bigquery.FC4	Bigquery.T13 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C67, depends on Bigquery.C66, assured by Bigquery.C68] Ensure each transfer uses an authorized source and its authorized configuration.	Request 1) the mechanism ensuring only an authorized source and its authorized configuration is configured, 2) its records of execution for all new sources, and 3) the plan to move any older sources.	Medium	Bigquery.FC4	Bigquery.T13 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C68] Verify each transfer uses an authorized source and its authorized configuration.	For a transfer, 1) use an unauthorized source, 2) remove an authorized source, or 3) use an unauthorized configuration for a source; it should be detected.	Medium	Bigquery.FC4	-	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C70] Maintain a list of authorized Cloud Storage buckets to be used with query jobs for User-Defined Functions (UDFs).	Request the list of Cloud Storage buckets used with query jobs for User-Defined Functions (UDFs).	High	Bigquery.FC1	Bigquery.T20 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C71, depends on Bigquery.C70, assured by Bigquery.C72] Ensure each query uses an authorized Cloud Storage bucket for a UDF.	Request 1) the mechanism ensuring only authorized Cloud Storage bucket is configured, 2) its records of execution for all new Cloud Storage buckets, and 3) the plan to move any older Cloud Storage buckets.	Medium	Bigquery.FC1	Bigquery.T20 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C72] Verify each query uses an authorized Cloud Storage bucket for a UDF.	For a UDF, use an unauthorized bucket; it should be detected.	Medium	Bigquery.FC1	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C74] Enforce secure SDLC process on User-Defined Functions (e.g., using source control, static analysis, dynamic analysis, peer review).	Request the process and records of enforcing the SDLC process on UDFs to ensure reviews of their code.	Medium	Bigquery.FC1	Bigquery.T20 (High)	Medium
Directive (COSO) Identify (NIST CSF)	[Bigquery.C78] Define the authorized expiration time for each ML model.	Request the authorized expiration time for each ML model.	Low	Bigquery.FC6	Bigquery.T22 (Very Low)	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C79, depends on Bigquery.C78, assured by Bigquery.C80] Ensure the expiration time for each ML model is authorized.	Request the mechanism ensuring the expiration time for each ML model is authorized, and the evidence of its execution.	High	Bigquery.FC6	Bigquery.T22 (High)	Medium
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C80] Verify all ML models have an authorized expiration time.	Create an ML model. With unauthorized expiration time; it should be detected.	High	Bigquery.FC6	-	Medium
Directive (COSO) Protect (NIST CSF)	[Bigquery.C28, depends on Bigquery.C26] Protect the CMEKs used by BigQuery datasets and models, using the Cloud KMS ThreatModel.	Request how the Cloud KMS ThreatModel is applied to BigQuery datasets and models.	High	Bigquery.FC1	Bigquery.T3 (Medium) Bigquery.T11 (Medium) Bigquery.T20 (Medium)	Low

Directive (COSO) Identify (NIST CSF)	[Bigquery.C75] Define the authorized configuration (e.g., createDisposition, writeDisposition, schemaUpdateOptions) for each asynchronous query job.	Request the authorized configuration for each asynchronous query job, its review process, and its review records.	Low	Bigquery.FC1	Bigquery.T20 (Very Low)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C76, depends on Bigquery.C75, assured by Bigquery.C77] Ensure the configuration of each asynchronous query job is authorized.	Request the mechanism ensuring the configuration of each asynchronous query job is authorized, and the evidence of its execution.	High	Bigquery.FC1	Bigquery.T20 (Medium)	Low
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C77] Verify all asynchronous query jobs have authorized configurations.	Create an asynchronous query job with unauthorized configurations; it should be detected.	High	Bigquery.FC1	-	Low
Detective (COSO) Detect (NIST CSF)	[Bigquery.C43] Monitor slot capacity (e.g., using slot estimator) to estimate the correct number of slots for the BigQuery workload.	Stop unnecessary slots; it should be detected.	Low	Bigquery.FC5	Bigquery.T12 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C41] Ensure Cloud Audit logs for BigQuery Data Transfer are enabled (ref).	Request the implementation for enabling the Cloud Audit logs for BigQuery Data Transfer and its records for execution.	Medium	Bigquery.FC4	Bigquery.T13 (Low)	Low
Detective (COSO) Detect (NIST CSF)	[Bigquery.C42] Monitor the abnormal number of concurrent connections and throughput for the BigQuery table (e.g., by using the Monitoring metric CONSUMER QUOTA - QUOTA LIMIT).	Ingest a large amount of data into a BigQuery table; it should be detected.	Low	Bigquery.FC1 Bigquery.FC6	Bigquery.T4 (Low) Bigquery.T5 (Very Low)	Low
Detective (COSO) Detect (NIST CSF)	[Bigquery.C65] Monitor the quality of data used with the ML models (e.g., by data profiling).	Ingest bogus data in a table; it should be detected.	Low	Bigquery.FC6	Bigquery.T4 (Low)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C69, depends on Bigquery.C66] Protect the sources used with each transfer, using the respective service's ThreatModel.	Request how the respective service ThreatModel is applied to protect each BigQuery Data Transfer source.	High	Bigquery.FC4	Bigquery.T13 (Medium)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C73, depends on Bigquery.C70] Protect the Cloud Storage buckets used for storing UDFs, using Cloud Storage ThreatModel.	Request how the Cloud Storage ThreatModel is applied to buckets used for storing UDFs.	High	Bigquery.FC1	Bigquery.T20 (Medium)	Low
Directive (COSO) Protect (NIST CSF)	[Bigquery.C30, assured by Bigquery.C31] Ensure the quotas on BigQuery (e.g., query limits, streaming insert limits, etc.) are set as per the API usage statistics.	Request the mechanism to ensure the quotas on BigQuery (e.g., query limits, streaming insert limits, etc.) are set as per the API usage statistics.	High	Bigquery.FC1	Bigquery.T7 (High)	Very Low
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C31] Verify the quotas on BigQuery are set as per the API usage statistics.	Do not set the quotas on BigQuery as per the API usage statistics; it should be detected.	High	Bigquery.FC1	-	Very Low

Appendix 2 - List of all Actions and their details

Id	Description	Feature Class ID	IAM Permission	Event	API
Bigquery.A1	Gets the access control policy for a resource. Returns an empty policy if the resource exists and does not have a policy set.	Bigquery.FC1	bigquery.tables.getIamPolicy	-	bigquery.tables.getIamPolicy
Bigquery.A2	Updates information in an existing table. The update method replaces the entire table resource, whereas the patch method only replaces fields that are provided in the submitted table resource. This method supports patch semantics.	Bigquery.FC1	bigquery.tables.update	google.cloud.bigquery.v2.TableService.PatchTable	bigquery.tables.patch
Bigquery.A3	Returns permissions that a caller has on the specified resource. If the resource does not exist, this will return an empty set of permissions, not a not_found error.	Bigquery.FC1	-	-	bigquery.tables.testIamPermissions
Bigquery.A4	Updates information in an existing table. The update method replaces the entire table resource, whereas the patch method only replaces fields that are provided in the submitted table resource.	Bigquery.FC1	bigquery.tables.update	jobservice.insert,tableservice.update	bigquery.tables.update
Bigquery.A5	Creates a new, empty table in the dataset.	Bigquery.FC1	bigquery.tables.create	jobservice.insert,tableservice.insert,google.cloud.bigquery.v2.TableService.InsertTable	bigquery.tables.insert
Bigquery.A6	Gets the specified table resource by table ID. This method does not return the data in the table, it only returns the table resource, which describes the structure of this table.	Bigquery.FC1	bigquery.tables.get	-	bigquery.tables.get
Bigquery.A7	Sets the access control policy on the specified resource. Replaces any existing policy.	Bigquery.FC1	bigquery.tables.setIamPolicy	-	bigquery.tables.setIamPolicy
Bigquery.A8	Lists all tables in the specified dataset.	Bigquery.FC1	bigquery.tables.list	-	bigquery.tables.list
Bigquery.A9	Deletes the table specified by tableid from the dataset. If the table contains data, all the data will be deleted.	Bigquery.FC1	bigquery.tables.delete	datasetservice.delete,tableservice.delete,google.cloud.bigquery.v2.TableService.DeleteTable	bigquery.tables.delete
Bigquery.A10	Create new table snapshots.	Bigquery.FC7	bigquery.tables.createSnapshot	-	-
Bigquery.A11	Delete table snapshots.	Bigquery.FC7	bigquery.tables.deleteSnapshot	-	-
Bigquery.A12	Export table data out of BigQuery.	Bigquery.FC1	bigquery.tables.export	-	-
Bigquery.A13	Restore table snapshots.	Bigquery.FC7	bigquery.tables.restoreSnapshot	-	-
Bigquery.A14	Set policy tags in table schema.	Bigquery.FC1	bigquery.tables.setCategory	-	-
Bigquery.A15	Update tags for a table.	Bigquery.FC1	bigquery.tables.updateTag	-	-
Bigquery.A16	Streams data into BigQuery one record at a time without needing to run a load job.	Bigquery.FC1	bigquery.tables.updateData	-	bigquery.tabledata.insertAll
Bigquery.A17	Retrieves table data from a specified set of rows.	Bigquery.FC1	bigquery.tables.getData	tabledataservice.list,google.cloud.bigquery.v2.TableDataService.List	bigquery.tabledata.list

Bigquery.A18	Returns information about a specific job. Job information is available for a six-month period after creation.	Bigquery.FC1	bigquery.jobs.get	-	bigquery.jobs.get
Bigquery.A19	Starts a new asynchronous job.	Bigquery.FC1	bigquery.jobs.create	jobservice.insert,google.cloud.bigquery.v2.JobService.InsertJob	bigquery.jobs.insert
Bigquery.A20	Lists all jobs that you started in the specified project. Job information is available for a six-month period after creation. The job list is sorted in reverse chronological order, by job creation time.	Bigquery.FC1	bigquery.jobs.list	-	bigquery.jobs.list
Bigquery.A21	List all jobs and retrieve metadata on any job submitted by any user.	Bigquery.FC1	bigquery.jobs.listAll	-	bigquery.jobs.listAll
Bigquery.A22	Requests that a job be cancelled. This call will return immediately, and the client will need to poll for the job status to see if the cancel completed successfully.	Bigquery.FC1	bigquery.jobs.update	-	bigquery.jobs.cancel
Bigquery.A23	Requests that a job is deleted. This call will return when the job is deleted. This method is available in limited preview.	Bigquery.FC1	bigquery.jobs.delete	-	bigquery.jobs.delete
Bigquery.A24	Runs a BigQuery SQL query synchronously and returns query results if the query completes within a specified timeout.	Bigquery.FC1	bigquery.jobs.create	google.cloud.bigquery.v2.JobService.Query,jobservice.query	bigquery.jobs.query
Bigquery.A25	Retrieves the results of a query job.	Bigquery.FC1	bigquery.tables.getData	jobservice.getqueryresults	bigquery.jobs.getQueryResults
Bigquery.A26	Lists all routines in the specified dataset.	Bigquery.FC2	bigquery.routines.list	-	bigquery.routines.list
Bigquery.A27	Gets the specified routine resource by routine ID.	Bigquery.FC2	bigquery.routines.get	-	bigquery.routines.get
Bigquery.A28	Creates a new routine in the dataset.	Bigquery.FC2	bigquery.routines.create	-	bigquery.routines.insert
Bigquery.A29	Deletes the routine specified by routineid from the dataset.	Bigquery.FC2	bigquery.routines.delete	datasetservice.delete	bigquery.routines.delete
Bigquery.A30	Updates information in an existing routine. The update method replaces the entire routine resource.	Bigquery.FC2	bigquery.routines.update	-	bigquery.routines.update
Bigquery.A31	Returns the dataset specified by datasetid.	Bigquery.FC1	bigquery.datasets.get	-	bigquery.datasets.get
Bigquery.A32	Updates information in an existing dataset. The update method replaces the entire dataset resource, whereas the patch method only replaces fields that are provided in the submitted dataset resource. This method supports patch semantics.	Bigquery.FC1	bigquery.datasets.update	-	bigquery.datasets.patch
Bigquery.A33	Lists all datasets in the specified project.	Bigquery.FC1	bigquery.datasets.get	-	bigquery.datasets.list
Bigquery.A34	Deletes the dataset specified by the datasetid value. Before you can delete a dataset, you must delete all its tables, either manually or by specifying deletecontents. Immediately after deletion, you can create another dataset with the same name.	Bigquery.FC1	bigquery.datasets.delete	datasetservice.delete,google.cloud.bigquery.v2.DatasetService.DeleteDataset	bigquery.datasets.delete
Bigquery.A35	Creates a new empty dataset.	Bigquery.FC1	bigquery.datasets.create	datasetservice.insert	bigquery.datasets.insert
Bigquery.A36	Updates information in an existing dataset. The update method replaces the entire dataset resource, whereas the	Bigquery.FC1	bigquery.datasets.update	-	bigquery.datasets.update

	patch method only replaces fields that are provided in the submitted dataset resource.				
Bigquery.A37	Read a dataset's IAM permissions (via the console).	Bigquery.FC1	bigquery.datasets.getIamPolicy	-	-
Bigquery.A38	Change a dataset's IAM permissions (via the console).	Bigquery.FC1	bigquery.datasets.setIamPolicy	-	-
Bigquery.A39	Update tags for a dataset.	Bigquery.FC1	bigquery.datasets.updateTag	-	-
Bigquery.A40	Create a new row-level access policy on a table.	Bigquery.FC1	bigquery.rowAccessPolicies.create	-	-
Bigquery.A41	Delete a row-level access policy from a table.	Bigquery.FC1	bigquery.rowAccessPolicies.delete	-	-
Bigquery.A42	Gets data in a table that you want to be visible only to the members of a row-level access policy's grantee list. We recommend this permission only be granted on a row-level access policy resource.	Bigquery.FC1	bigquery.rowAccessPolicies.getFilteredData	-	-
Bigquery.A43	Re-create a row-level access policy.	Bigquery.FC1	bigquery.rowAccessPolicies.update	-	-
Bigquery.A44	Returns permissions that a caller has on the specified resource. If the resource does not exist, this will return an empty set of permissions, not a not_found error.	Bigquery.FC1	-	-	bigquery.rowAccessPolicies.testIamPermissions
Bigquery.A45	Gets the access control policy for a resource. Returns an empty policy if the resource exists and does not have a policy set.	Bigquery.FC1	bigquery.rowAccessPolicies.getIamPolicy	-	bigquery.rowAccessPolicies.getIamPolicy
Bigquery.A46	Lists all row access policies on the specified table.	Bigquery.FC1	bigquery.rowAccessPolicies.list	-	bigquery.rowAccessPolicies.list
Bigquery.A47	Sets the access control policy on the specified resource. Replaces any existing policy.	Bigquery.FC1	bigquery.rowAccessPolicies.setIamPolicy	-	bigquery.rowAccessPolicies.setIamPolicy
Bigquery.A48	Returns the email address of the service account for your project used for interactions with Google Cloud KMS.	Bigquery.FC1	-	-	bigquery.projects.getServiceAccount
Bigquery.A49	Lists all projects to which you have been granted any project role.	Bigquery.FC1	-	-	bigquery.projects.list
Bigquery.A50	Create new models.	Bigquery.FC6	bigquery.models.create	-	-
Bigquery.A51	Get model data.	Bigquery.FC6	bigquery.models.getData	-	bigquery.models.get
Bigquery.A52	Get model metadata.	Bigquery.FC6	bigquery.models.getMetadata	-	bigquery.models.get
Bigquery.A53	Update model data.	Bigquery.FC6	bigquery.models.updateData	-	bigquery.models.patch
Bigquery.A54	Update model metadata.	Bigquery.FC6	bigquery.models.updateMetadata	-	bigquery.models.patch
Bigquery.A55	Deletes the model specified by modelid from the dataset.	Bigquery.FC6	bigquery.models.delete	datasetservice.delete	bigquery.models.delete
Bigquery.A56	Lists all models in the specified dataset.	Bigquery.FC6	bigquery.models.list	-	bigquery.models.list
Bigquery.A57	Export a model.	Bigquery.FC6	bigquery.models.export	-	-
Bigquery.A58	Create saved queries (console only).	Bigquery.FC1	bigquery.savedqueries.create	-	-
Bigquery.A59	Delete saved queries (console only).	Bigquery.FC1	bigquery.savedqueries.delete	-	-

Bigquery.A60	Get metadata on saved queries (console only).	Bigquery.FC1	bigquery.savedqueries.get	-	-
Bigquery.A61	List saved queries (console only).	Bigquery.FC1	bigquery.savedqueries.list	-	-
Bigquery.A62	Update saved queries (console only).	Bigquery.FC1	bigquery.savedqueries.update	-	-
Bigquery.A63	Use a connection configuration to connect to a remote data source.	Bigquery.FC3	bigquery.connections.use	-	-
Bigquery.A64	Returns specified connection.	Bigquery.FC3	bigquery.connections.get	google.cloud.bigquery.connection.v1.ConnectionService.GetConnection	bigqueryconnection.projects.locations.connections.get
Bigquery.A65	Deletes connection and associated credential.	Bigquery.FC3	bigquery.connections.delete	google.cloud.bigquery.connection.v1.ConnectionService.DeleteConnection	bigqueryconnection.projects.locations.connections.delete
Bigquery.A66	Updates the specified connection. For security reasons, also resets credential if connection properties are in the update field mask.	Bigquery.FC3	bigquery.connections.update	google.cloud.bigquery.connection.v1.ConnectionService.UpdateConnection	bigqueryconnection.projects.locations.connections.patch
Bigquery.A67	Returns a list of connections in the given project.	Bigquery.FC3	bigquery.connections.list	google.cloud.bigquery.connection.v1.ConnectionService.ListConnections	bigqueryconnection.projects.locations.connections.list
Bigquery.A68	Gets the access control policy for a resource. Returns an empty policy if the resource exists and does not have a policy set.	Bigquery.FC3	bigquery.connections.getIamPolicy	google.cloud.bigquery.connection.v1.ConnectionService.GetIamPolicy	bigqueryconnection.projects.locations.connections.getIamPolicy
Bigquery.A69	Creates a new connection.	Bigquery.FC3	bigquery.connections.create	google.cloud.bigquery.connection.v1.ConnectionService.CreateConnection	bigqueryconnection.projects.locations.connections.create
Bigquery.A70	Returns permissions that a caller has on the specified resource. If the resource does not exist, this will return an empty set of permissions, not a not_found error.	Bigquery.FC3	-	-	bigqueryconnection.projects.locations.connections.testIamPermissions
Bigquery.A71	Sets the access control policy on the specified resource. Replaces any existing policy.	Bigquery.FC3	bigquery.connections.setIamPolicy	google.cloud.bigquery.connection.v1.ConnectionService.SetIamPolicy	bigqueryconnection.projects.locations.connections.setIamPolicy
Bigquery.A73	Lists information about the supported locations for this service.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.list
Bigquery.A74	Gets information about a location.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.get
Bigquery.A75	Deletes the specified transfer run.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.runs.delete
Bigquery.A76	Returns information about the particular transfer run.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.transferConfigs.runs.get
Bigquery.A77	Returns information about running and completed jobs.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.transferConfigs.runs.list

Bigquery.A78	Returns user facing log messages for the data transfer run.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.transferConfigs.runs.transferLogs.list
Bigquery.A79	Creates transfer runs for a time range [start_time, end_time]. For each date - or whatever granularity the data source supports - in the range, one transfer run is created. Note that runs are created per utc time in the time range. Deprecated: use startmanualtransferruns instead.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.scheduleRuns
Bigquery.A80	Returns information about a data transfer config.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.transferConfigs.get
Bigquery.A81	Start manual transfer runs to be executed now with schedule_time equal to current time. The transfer runs can be created for a time range where the run_time is between start_time (inclusive) and end_time (exclusive), or for a specific run_time.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.startManualRuns
Bigquery.A82	Returns information about all data transfers in the project.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.transferConfigs.list
Bigquery.A83	Creates a new data transfer configuration.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.create
Bigquery.A84	Deletes a data transfer configuration, including any associated transfer runs and logs.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.delete
Bigquery.A85	Updates a data transfer configuration. All fields must be set, even if they are not updated.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.locations.transferConfigs.patch
Bigquery.A86	Retrieves a supported data source and returns its settings, which can be used for ui rendering.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.dataSources.get
Bigquery.A87	Returns true if valid credentials exist for the given data source and requesting user. Some data sources doesn't support service account, so we need to talk to them on behalf of the end user. This API just checks whether we have OAuth token for the particular user, which is a pre-requisite before user can create a transfer config.	Bigquery.FC4	-	-	bigquerydatatransfer.projects.locations.dataSources.checkValidCreds
Bigquery.A88	Lists supported data sources and returns their settings, which can be used for ui rendering.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.locations.dataSources.list
Bigquery.A89	Retrieves a supported data source and returns its settings, which can be used for ui rendering.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.dataSources.get
Bigquery.A90	Lists supported data sources and returns their settings, which can be used for ui rendering.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.dataSources.list
Bigquery.A91	Returns true if valid credentials exist for the given data source and requesting user. Some data sources doesn't support service account, so we need to talk to them on behalf of the end user. This API just checks whether we have OAuth token	Bigquery.FC4	-	-	bigquerydatatransfer.projects.dataSources.checkValidCreds

	for the particular user, which is a pre-requisite before user can create a transfer config.				
Bigquery.A92	Returns information about running and completed jobs.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.transferConfigs.runs.list
Bigquery.A93	Deletes the specified transfer run.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.runs.delete
Bigquery.A94	Returns information about the particular transfer run.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.transferConfigs.runs.get
Bigquery.A95	Returns user facing log messages for the data transfer run.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.transferConfigs.runs.transferLogs.list
Bigquery.A96	Returns information about a data transfer config.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.transferConfigs.get
Bigquery.A97	Returns information about all data transfers in the project.	Bigquery.FC4	bigquery.transfers.get	-	bigquerydatatransfer.projects.transferConfigs.list
Bigquery.A98	Updates a data transfer configuration. All fields must be set, even if they are not updated.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.patch
Bigquery.A99	Creates transfer runs for a time range [start_time, end_time]. For each date - or whatever granularity the data source supports - in the range, one transfer run is created. Note that runs are created per utc time in the time range. Deprecated: use startmanualtransferruns instead.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.scheduleRuns
Bigquery.A100	Start manual transfer runs to be executed now with schedule_time equal to current time. The transfer runs can be created for a time range where the run_time is between start_time (inclusive) and end_time (exclusive), or for a specific run_time.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.startManualRuns
Bigquery.A101	Creates a new data transfer configuration.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.create
Bigquery.A102	Deletes a data transfer configuration, including any associated transfer runs and logs.	Bigquery.FC4	bigquery.transfers.update	-	bigquerydatatransfer.projects.transferConfigs.delete
Bigquery.A103	Returns information about the capacity commitment.	Bigquery.FC5	bigquery.capacityCommitments.get	-	bigqueryreservation.projects.locations.capacityCommitments.get
Bigquery.A104	Merges capacity commitments of the same plan into a single commitment. The resulting capacity commitment has the greater commitment_end_time out of the to-be-merged capacity commitments. Attempting to merge capacity commitments of different plan will fail with the error code google. Rpc. Code. Failed_precondition.	Bigquery.FC5	-	-	bigqueryreservation.projects.locations.capacityCommitments.merge
Bigquery.A105	Lists all the capacity commitments for the admin project.	Bigquery.FC5	bigquery.capacityCommitments.list	-	bigqueryreservation.projects.locations.capacityCommitments.list

Bigquery.A106	Creates a new capacity commitment resource.	Bigquery.FC5	bigquery.capacityCommitments.create	-	bigqueryreservation.projects.locations.capacityCommitments.create
Bigquery.A107	Splits capacity commitment to two commitments of the same plan and commitment_end_time. A common use case is to enable downgrading commitments. For example, in order to downgrade from 10000 slots to 8000, you might split a 10000 capacity commitment into commitments of 2000 and 8000. Then, you would change the plan of the first one to flex and then delete it.	Bigquery.FC5	-	-	bigqueryreservation.projects.locations.capacityCommitments.split
Bigquery.A108	Deletes a capacity commitment. Attempting to delete capacity commitment before its commitment_end_time will fail with the error code google. Rpc. Code. Failed_precondition.	Bigquery.FC5	bigquery.capacityCommitments.delete	-	bigqueryreservation.projects.locations.capacityCommitments.delete
Bigquery.A109	Updates an existing capacity commitment. Only plan and renewal_plan fields can be updated. Plan can only be changed to a plan of a longer commitment period. Attempting to change to a plan with shorter commitment period will fail with the error code google. Rpc. Code. Failed_precondition.	Bigquery.FC5	bigquery.capacityCommitments.update	-	bigqueryreservation.projects.locations.capacityCommitments.patch
Bigquery.A110	Creates an assignment object which allows the given project to submit jobs of a certain type using slots from the specified reservation.	Bigquery.FC5	bigquery.reservationAssignments.create	google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment	bigqueryreservation.projects.locations.reservations.assignments.create
Bigquery.A111	Deletes a assignment.	Bigquery.FC5	bigquery.reservationAssignments.delete	google.cloud.bigquery.reservation.v1.ReservationService.DeleteAssignment	bigqueryreservation.projects.locations.reservations.assignments.delete
Bigquery.A112	Lists assignments. Only explicitly created assignments will be returned.	Bigquery.FC5	bigquery.reservationAssignments.list	-	bigqueryreservation.projects.locations.reservations.assignments.list
Bigquery.A113	Moves an assignment under a new reservation. This differs from removing an existing assignment and recreating a new one by providing a transactional change that ensures an assignee always has an associated reservation.	Bigquery.FC5	-	-	bigqueryreservation.projects.locations.reservations.assignments.move
Bigquery.A114	Lists all the reservations for the project in the specified location.	Bigquery.FC5	bigquery.reservations.list	-	bigqueryreservation.projects.locations.reservations.list
Bigquery.A115	Returns information about the reservation.	Bigquery.FC5	bigquery.reservations.get	-	bigqueryreservation.projects.locations.reservations.get
Bigquery.A116	Deletes a reservation. Returns google. Rpc. Code. Failed_precondition when reservation has assignments.	Bigquery.FC5	bigquery.reservations.delete	google.cloud.bigquery.reservation.v1.ReservationService.DeleteReservation	bigqueryreservation.projects.locations.reservations.delete
Bigquery.A117	Creates a new reservation resource.	Bigquery.FC5	bigquery.reservations.create	google.cloud.bigquery.reservation.v1.ReservationService.CreateAssignment	bigqueryreservation.projects.locations.reservations.create

Bigquery.A118	Updates an existing reservation resource.	Bigquery.FC5	bigquery.reservations.update	google.cloud.bigquery.reservation.v1.ReservationService.UpdateReservation	bigqueryreservation.projects.locations.reservations.patch
Bigquery.A119	Retrieves a BI reservation.	Bigquery.FC5	bigquery.bireservations.get	-	bigqueryreservation.projects.locations.getBiReservation
Bigquery.A120	Looks up assignments for a specified resource for a particular region. If the request is about a project: 1. Assignments created on the project will be returned if they exist. 2. Otherwise assignments created on the closest ancestor will be returned. 3. Assignments for different jobtypes will all be returned. The same logic applies if the request is about a folder. If the request is about an organization, then assignments created on the organization will be returned (organization doesn't have ancestors).	Bigquery.FC5	-	-	bigqueryreservation.projects.locations.searchAllAssignments
Bigquery.A121	Updates a BI reservation. Only fields specified in the field_mask are updated. A singleton BI reservation always exists with default size 0. In order to reserve BI capacity it needs to be updated to an amount greater than 0. In order to release BI Capacity Reservation size must be set to 0.	Bigquery.FC5	bigquery.bireservations.update	-	bigqueryreservation.projects.locations.updateBiReservation
Bigquery.A122	Looks up assignments for a specified resource for a particular region. If the request is about a project: 1. Assignments created on the project will be returned if they exist. 2. Otherwise assignments created on the closest ancestor will be returned. 3. Assignments for different jobtypes will all be returned. The same logic applies if the request is about a folder. If the request is about an organization, then assignments created on the organization will be returned (organization doesn't have ancestors).	Bigquery.FC5	bigquery.reservationAssignments.search	-	bigqueryreservation.projects.locations.searchAssignments
Bigquery.A125	Updates the tags for an existing connection.	Bigquery.FC3	bigquery.connections.updateTag	-	-
Bigquery.A126	Updates the tags for an existing model.	Bigquery.FC6	bigquery.models.updateTag	-	-
Bigquery.A130	Updates the tags for an existing routine.	Bigquery.FC2	bigquery.routines.updateTag	-	-
Bigquery.A131	Enroll data sources in a user project. This allows users to create transfer configurations for these data sources.	Bigquery.FC4	-	-	bigquerydatatransfer.projects.enrollDataSources
Bigquery.A132	Enroll data sources in a user project. This allows users to create transfer configurations for these data sources.	Bigquery.FC4	-	-	bigquerydatatransfer.projects.locations.enrollDataSources
Bigquery.A134	Access historical data for a table that has, or has previously had, row-level access policies.	Bigquery.FC1	bigquery.rowAccessPolicies.overrideTimeTravelRestrictions	-	-
Bigquery.A135	Delegate connection to create authorized external tables and remote functions.	Bigquery.FC3	bigquery.connections.delegate	-	-
Bigquery.A136	Retrieve execution metadata on any job.	Bigquery.FC1	bigquery.jobs.listExecutionMetadata	-	-

Bigquery.A137	Create index of a table.	Bigquery.FC1	bigquery.tables.createIndex	-	-
Bigquery.A138	Delete index of a table.	Bigquery.FC1	bigquery.tables.deleteIndex	-	-
Bigquery.A139	Creates a new data policy under a project with the given dataPolicyId (used as the display name), policy tag, and data policy type.	Bigquery.FC8	bigquery.dataPolicies.create	google.cloud.bigquery.datapolicies.v1.DataPolicyService.CreateDataPolicy	bigquerydatapolicy.projects.locations.dataPolicies.create
Bigquery.A140	Deletes the data policy specified by its resource name.	Bigquery.FC8	bigquery.dataPolicies.delete	google.cloud.bigquery.datapolicies.v1.DataPolicyService.DeleteDataPolicy	bigquerydatapolicy.projects.locations.dataPolicies.delete
Bigquery.A141	Gets the data policy specified by its resource name.	Bigquery.FC8	bigquery.dataPolicies.get	google.cloud.bigquery.datapolicies.v1.DataPolicyService.GetDataPolicy	bigquerydatapolicy.projects.locations.dataPolicies.get
Bigquery.A142	Gets the IAM policy for the specified data policy.	Bigquery.FC8	bigquery.dataPolicies.getIamPolicy	google.cloud.bigquery.datapolicies.v1.DataPolicyService.GetIamPolicy	bigquerydatapolicy.projects.locations.dataPolicies.getIamPolicy
Bigquery.A143	List all of the data policies in the specified parent project.	Bigquery.FC8	bigquery.dataPolicies.list	google.cloud.bigquery.datapolicies.v1.DataPolicyService.ListDataPolicies	bigquerydatapolicy.projects.locations.dataPolicies.list
Bigquery.A144	-.	Bigquery.FC8	bigquery.dataPolicies.maskedGet	-	-
Bigquery.A145	Sets the IAM policy for the specified data policy.	Bigquery.FC8	bigquery.dataPolicies.setIamPolicy	google.cloud.bigquery.datapolicies.v1.DataPolicyService.SetIamPolicy	bigquerydatapolicy.projects.locations.dataPolicies.setIamPolicy
Bigquery.A146	Updates the metadata for an existing data policy. The target data policy can be specified by the resource name.	Bigquery.FC8	bigquery.dataPolicies.update	google.cloud.bigquery.datapolicies.v1.DataPolicyService.UpdateDataPolicy	bigquerydatapolicy.projects.locations.dataPolicies.patch
Bigquery.A147	Renames the ID (display name) of the specified data policy.	Bigquery.FC8	bigquery.dataPolicies.update	google.cloud.bigquery.datapolicies.v1.DataPolicyService.RenameDataPolicy	bigquerydatapolicy.projects.locations.dataPolicies.rename
Bigquery.A148	Returns the caller's permission on the specified data policy resource.	Bigquery.FC8	-	TODO	bigquerydatapolicy.projects.locations.dataPolicies.testIamPermissions

The last Google BigQuery security document you will ever need **(and how to use it)**

TRUSTONCLOUD

Table of Contents

This publication includes:

- ☑ Overall data flow diagram of Google Cloud BigQuery
- ☑ Overview of the Mitre ATT&CK matrix for Google Cloud BigQuery
- ☑ Prioritized list of all threat scenarios
- ☑ List of all the control activities and testing procedures
- ☑ Risk-based prioritized list of control implementation

Source
The latest version of this work is hosted on GitHub.

Contact
If you have any questions, please contact
chatbot@trustoncloud.com

Introduction to **Google BigQuery ThreatModel**

How to use the ThreatModel for Google BigQuery

Using ControlCatalog:

To help our customers navigate the information in our ThreatModels, we have ControlCatalog, a reactive UI to navigate our ThreatModels. With ControlCatalog, we want to help anyone take advantage of the data from our ThreatModels. It allows the reader to pivot between threats and controls, set the MITRE ATT&CK®, see the top threats and controls, understand a particular flow, etc.

The ThreatModel is a detailed guide, packed with actionable insights and organized to address various use cases. Here's how you can make the most of it:

Reading the document:

The document might feel overwhelming with its 130+ pages. All pages of the ThreatModel are relevant for at least one-use case; your use case might only need some of the pages.

Everyday use cases we see from our customers are:

1. Covering the "best practices" (best security/effort ratio)
2. Reviewing the service depending on your application(s) and implementing the controls based on your risk tolerance
3. Understanding threats related to a specific Feature Class

For each use case, you will find below where to look, what you get, what to do, and for whom it typically makes sense.

1. Covering the “best practices” (e.g., best security/effort ratio)

Where to look in the ThreatModel

Refer to page 59 [Appendix 1 – Prioritized List for Control Implementation] for a ranking of controls based on their effectiveness.

What do you get out of it:

Review your controls, starting with the “Very High” priority (using the implementation column). Test your controls work (using the testing column). Feel free to skip controls not relevant to your usage of the service.

What to do

Start by reviewing the “Best Practices” section. Controls are prioritized based on their security impact and ease of implementation, enabling you to tackle high-priority areas first.

Appendix 1 - Prioritized list for control implementation

Type	Control	Testing	Effort	Feature Class(es)	Threat(s) and Impact	CVSS-weighted Priority
Directive (COSO) Protect (NIST CSF)	[Bigquery.C2] Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Request the process and records of enabling and protecting VPC Service Controls for BigQuery and BigQuery-connected services, using the Compute ThreatModel.	Low	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6 Bigquery.FC7 Bigquery.FC8	Bigquery.T1 (High) Bigquery.T3 (High) Bigquery.T4 (High) Bigquery.T5 (High) Bigquery.T6 (High) Bigquery.T7 (High) Bigquery.T8 (High) Bigquery.T9 (High) Bigquery.T10 (High) Bigquery.T11 (High) Bigquery.T12 (High) Bigquery.T13 (High) Bigquery.T14 (High) Bigquery.T15 (High) Bigquery.T17 (High) Bigquery.T18 (High) Bigquery.T19 (High) Bigquery.T20 (High) Bigquery.T21 (High) Bigquery.T22 (High) Bigquery.T23 (High) Bigquery.T24 (High) Bigquery.T26 (High)	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C15, assured by Bigquery.C16] Ensure no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", except if allowed.	Request 1) the mechanism ensuring no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers", 2) its records of execution for all datasets, and 3) the plan to move any older datasets.	Low	Bigquery.FC1 Bigquery.FC2	Bigquery.T8 (High) Bigquery.T9 (High)	Very High
Assurance (COSO) Detect (NIST CSF)	[Bigquery.C16] Verify no dataset is accessible to "AllUsers" or "AllAuthenticatedUsers" (e.g., using the Security Command Center finding PUBLIC_DATASET).	Modify a dataset to allow access to 1) "AllUsers", or 2) "AllAuthenticatedUsers"; it should be detected.	Very Low	Bigquery.FC1 Bigquery.FC2	-	Very High
Directive (COSO) Protect (NIST CSF)	[Bigquery.C1] Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	Request the list of authorized IAM members with the permissions required to launch the attack, its review process, and its review records.	High	Bigquery.FC1 Bigquery.FC2 Bigquery.FC3 Bigquery.FC4 Bigquery.FC5 Bigquery.FC6	Bigquery.T1 (Very High) Bigquery.T2 (Very High) Bigquery.T3 (Very High) Bigquery.T4 (Very High) Bigquery.T5 (Very High) Bigquery.T6 (Very High)	High

Typically for

DevOps team and/or not-too-sensitive workloads (or what we like to call it, “if it gets owned, we will have a bad week, not a bad year”)

2. Reviewing the service based on your risk tolerance

Not every control will be relevant to every use case. The ThreatModel allows you to assess risks and implement controls tailored to your organization's specific needs.

What do you get out of it:

We call feature classes the portion of the service you can enable (exposing you to risk on those APIs) while being able to disable the rest. You can go deeper with each feature class page with its Data Flow Diagram and associated threats and controls. This enables you to secure the parts of the service you are using without the need to waste cycles on securing parts of the services which aren't in use.

What to do

The "Risk Assessment" section helps you understand which controls are critical based on the threats your specific environment might face.

Where to look in the ThreatModel

Refer to page 59 [Appendix 1 – Prioritized List for Control Implementation] for a ranking of controls based on their effectiveness.

Feature Classes

BigQuery has the following feature classes and subclasses (i.e. dependent on the usage of its class) that can be activated, restricted, or blocked using Google Cloud Identity and Access Management.

Feature	Relation	Description
DataSet and tables (FC1)	class	You can create a table inside a dataset. You can run SQL queries and jobs on datasets in a very fast way. Jobs are actions that BigQuery runs on your behalf to load data, export data, query data, or copy data.
User-Defined Functions (FC2)	subclass of Dataset and tables	A User-Defined Function (UDF) lets you create a function by using a SQL expression or JavaScript code.
BigQuery connections and BigQuery Omni (FC3)	subclass of Dataset and tables	To create a connection for federated queries when adding data from external data sources or exporting data to cross Cloud Storages.
BigQuery Data Transfer (FC4)	subclass of Dataset and tables	You can transfer external data from SaaS applications to Google BigQuery on a regular basis.
BigQuery reservation (FC5)	subclass of Dataset and tables	You can purchase dedicated query processing capacity.
BigQuery ML (FC6)	subclass of Dataset and tables	You can create and execute machine learning models in BigQuery using standard SQL queries.
Table snapshot (FC7)	subclass of Dataset and tables	A BigQuery table snapshot preserves the contents of a table (called the base table) at a particular time.
Data policy (FC8)	subclass of Dataset and tables	You can provide different levels of visibility to different groups of users by using policy tags.

Typically for

Security Architects and/or for sensitive workloads (typically having reputational risks or regulatory risks)

3. Technology onboarding for large enterprises/agencies

Where to look in the ThreatModel

Everywhere. Typically, there is a decision from the enterprise/agency to use the service or not. We usually walk our customers through the relevant sections with our Cloud Threat Researchers.

What do you get out of it:

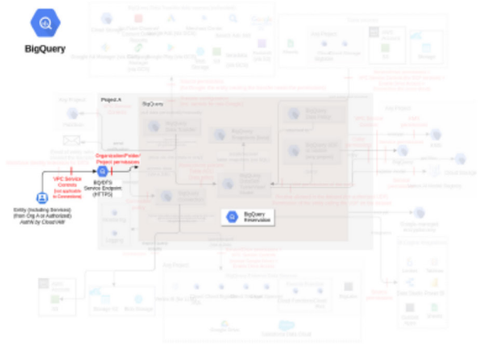
A complete overview of the service, its features, threats, and controls.

What to do

Consult the “Enterprise Security” section to ensure that your BigQuery deployment meets enterprise-level security standards.

Denial of Service/denial of wallet by removing/creating reservations

Threat Id	Bigquery.T12
Name	Denial of Service/denial of wallet by removing/creating reservations
Description	A slot is a dedicated vCPU that runs queries. Each slot is allocated to a reservation. An attacker can remove a reservation, failing any jobs that are currently executing with slots from that reservation or decreasing the performance for future jobs. An attacker can also create a reservation with unauthorized configurations or modify an existing reservation to achieve the same objective or incur cost.
Goal	Disruption of Service
MITRE ATT&CK®	TA0040
CVSS	Medium (4.8)
IAM Access	{ "OR": [{ "AND": ["bigquery.reservations.delete", "bigquery.reservationAssignments.delete"] }, { "AND": ["bigquery.reservationAssignments.create", { "OR": ["bigquery.reservations.create", "bigquery.reservations.update"] }] }] }



Control Objectives	Priority	# of associated Controls		
		Directive	Preventative	Detective
Enforce network-level restrictions leveraging VPC origin and VPC Service Controls Enforce VPC origin (e.g., using DNS redirection on a VPC-based proxy), allow port 443 only on the Firewalls, and configure VPC Service Controls (if applicable) for BigQuery and BigQuery-connected services (e.g., Pub/Sub, KMS) considering the different sensitivity of the environment (e.g., Prod vs. Non-Prod), using the Compute ThreatModel.	Very High	1	-	-
Limit access to the IAM actions required to execute the threats Limit the access to the IAM actions required to perform the attack, following the IAM Operating Model and using the IAM ThreatModel.	High	1	-	-
Monitor BigQuery capacity and utilization Monitor slot consumption (e.g., using slot recommender), job concurrency, job execution time, job errors, and bytes processed across the entire organization (e.g., using BigQuery Admin Resource Charts). Monitor slot capacity (e.g., using slot estimator) to estimate the correct number of slots for the BigQuery workload.	Medium	-	-	2
Ensure authorized configuration(s) are used with BigQuery datasets, tables, reservations, assignments, and asynchronous query jobs Define the authorized configuration for each reservation (i.e., maxSlots, edition, ignoreIdleSlots) and its assignments (i.e., assignee, jobType). Ensure each reservation and its assignments use an authorized configuration.	Medium	2	-	2

Typically for

For organizations with complex data needs, the ThreatModel provides advanced configurations to ensure compliance and data integrity at scale.

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