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Centralizing Cloud Logs and Events with Microsoft Sentinel

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Agenda

1. Introductions
2. Intra-Cloud Log Aggregation
3. Cross-Cloud Data Transfer Patterns
4. Microsoft Sentinel
5. Conclusions

$ aws sts get-caller-identity

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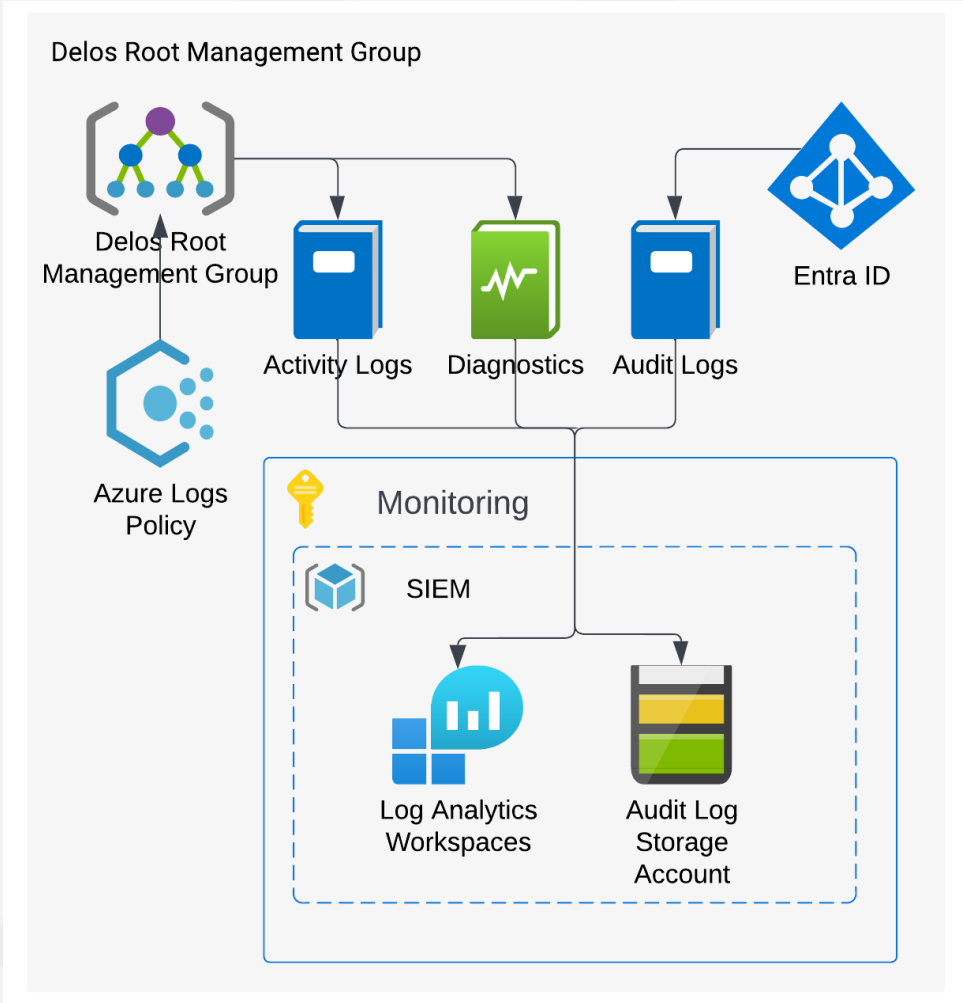
Intra-Cloud Log Aggregation

Azure: Centralized Logging Pattern

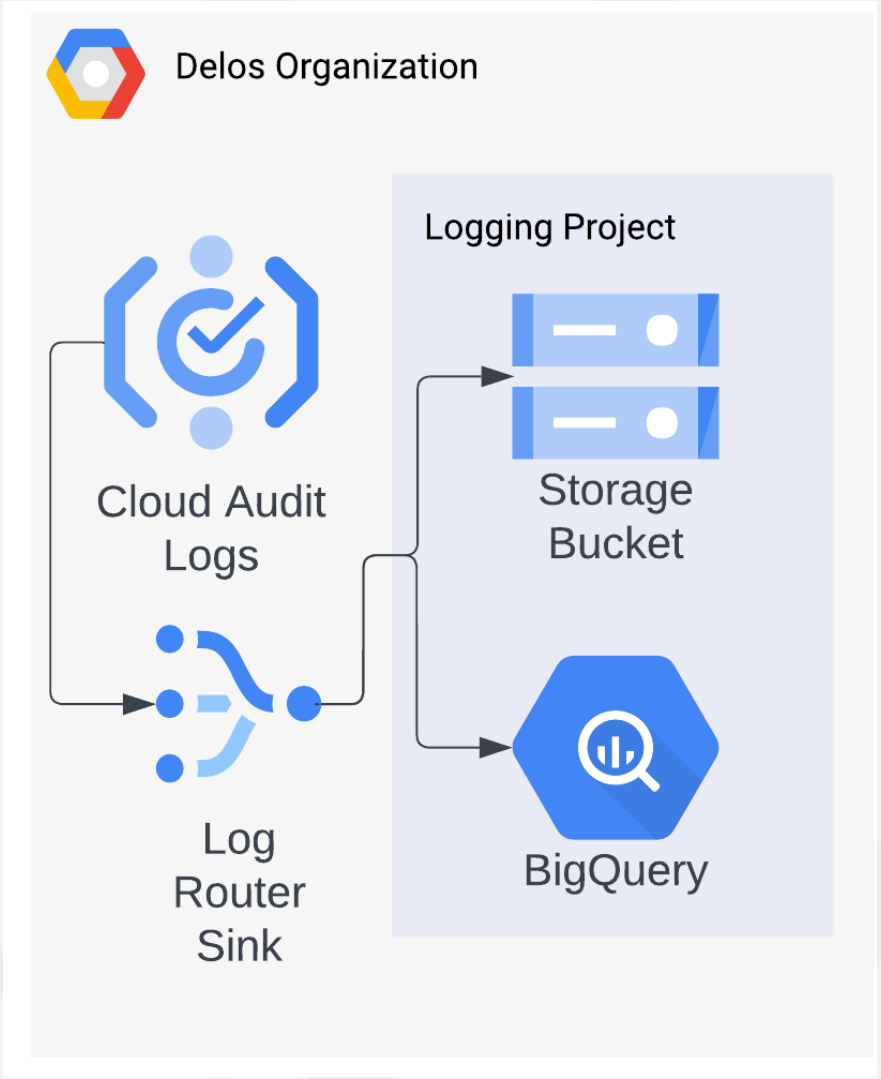
- Assign audit logging Azure Policy to the root management group:
  - New subscriptions and resources will automatically route log data to the central monitoring storage account / log analytics workspace
  - Existing subscriptions are marked "out of compliance" and fixed using a remediation task

- Create an Entra ID diagnostic setting to send audit and sign in logs to the monitoring subscription



Google Cloud: Centralized Logging Pattern

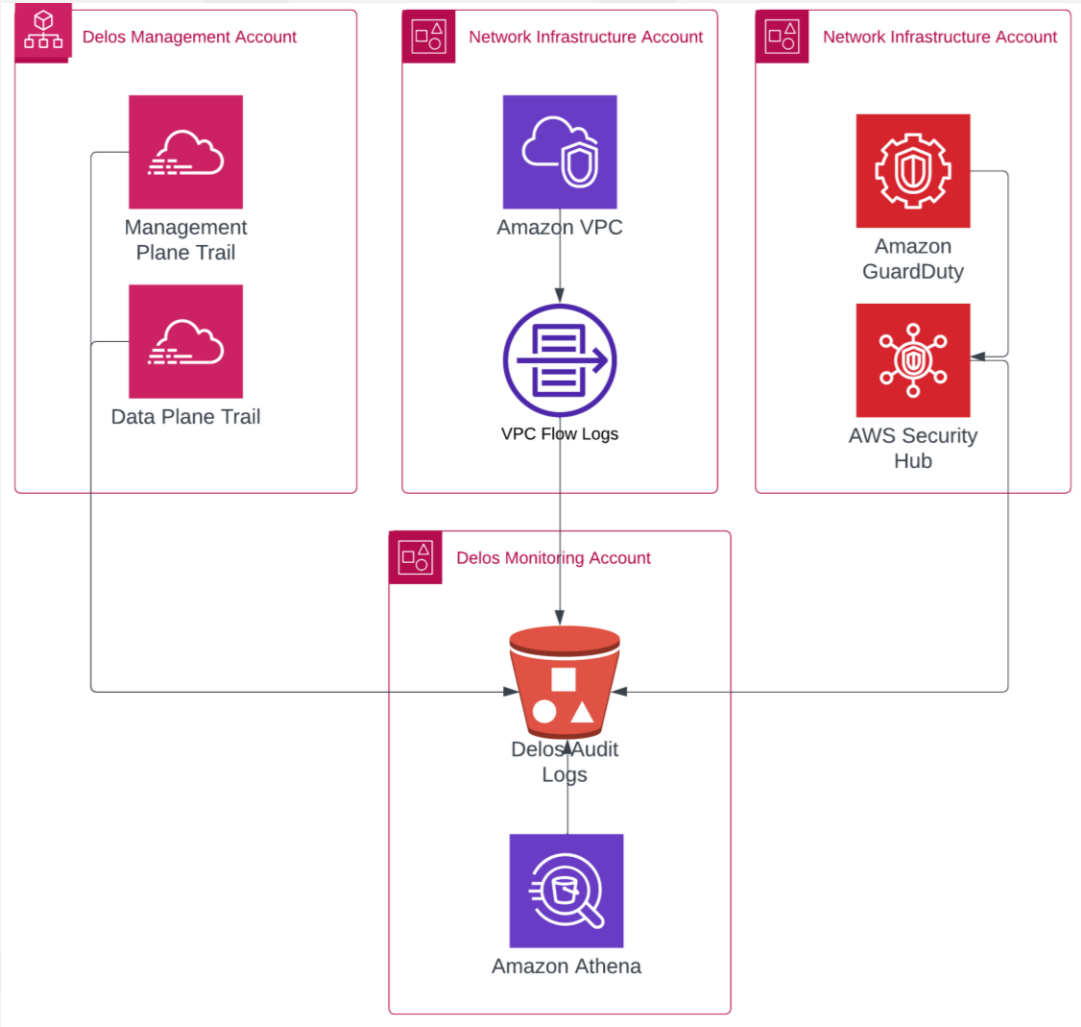
- Cloud audit logging captures admin activity logs by default
- Data plane audit logs are not enabled by default and must be enabled for each service
- Log router sinks can send log data from the organization's logging service to centralized storage, BigQuery, or Pub/Sub topics



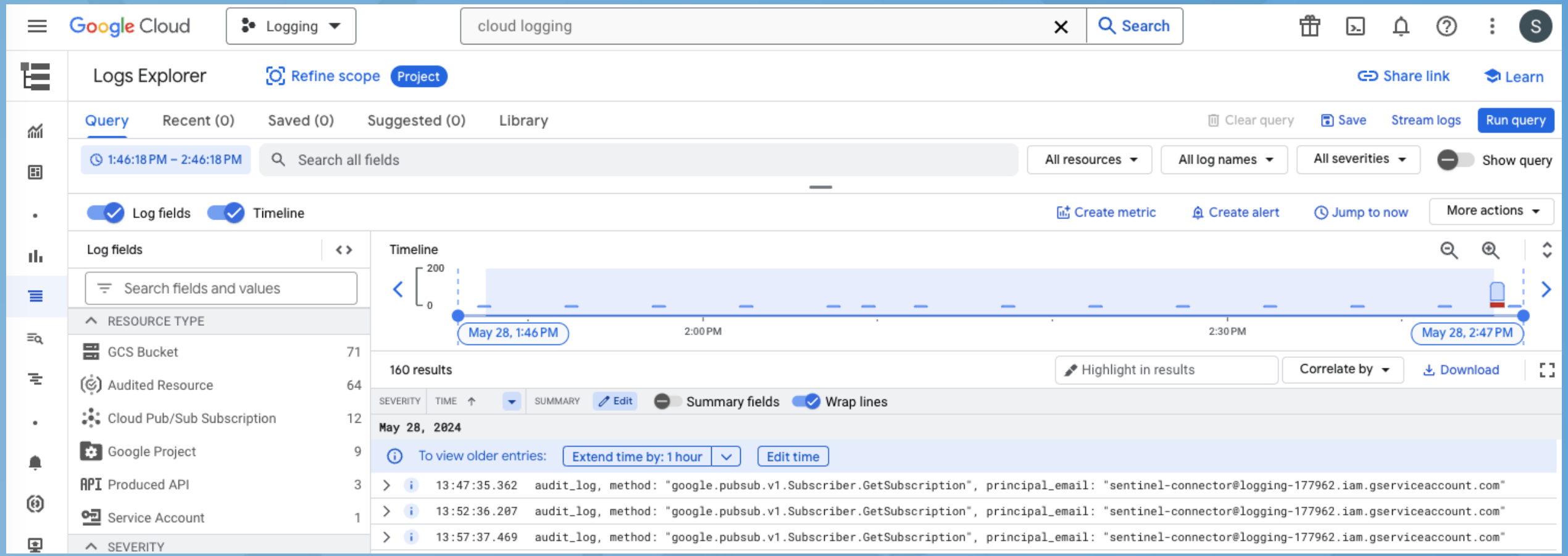
AWS: Centralized Logging Pattern

Centralizing log data in AWS is more complicated with cross-account S3 access required for:

- CloudTrail management and data plane trails
- VPC network flow logs
- Delegated Security Hub account findings from compliance, threat intelligence, and third-party scans.
- Delegated GuardDuty / Inspector findings



Demo: Intra-Cloud Data Aggregation



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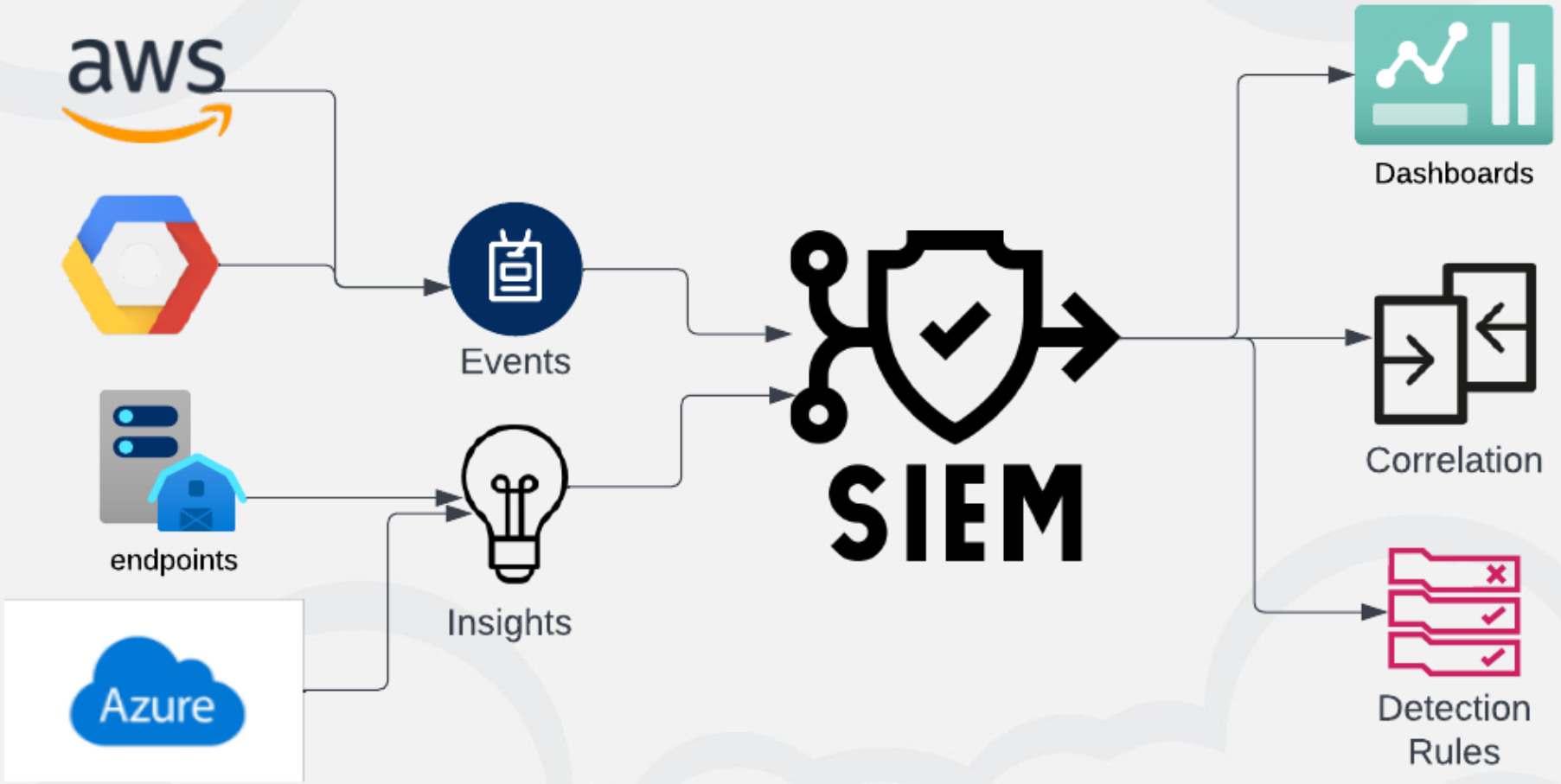
Cross-Cloud Log Aggregation

Centralizing High Value Cloud Log Sources



Data Transfer Patterns

Two design patterns are often used for migrating cloud data:

Push Architecture

- Supports real-time data streaming and event-driven systems
- Minimizes latency and deliver data is delivered as soon as it is ready
- Requires less noise as the receiver does not need to poll for new data
- Higher complexity managing connections and delivery formats

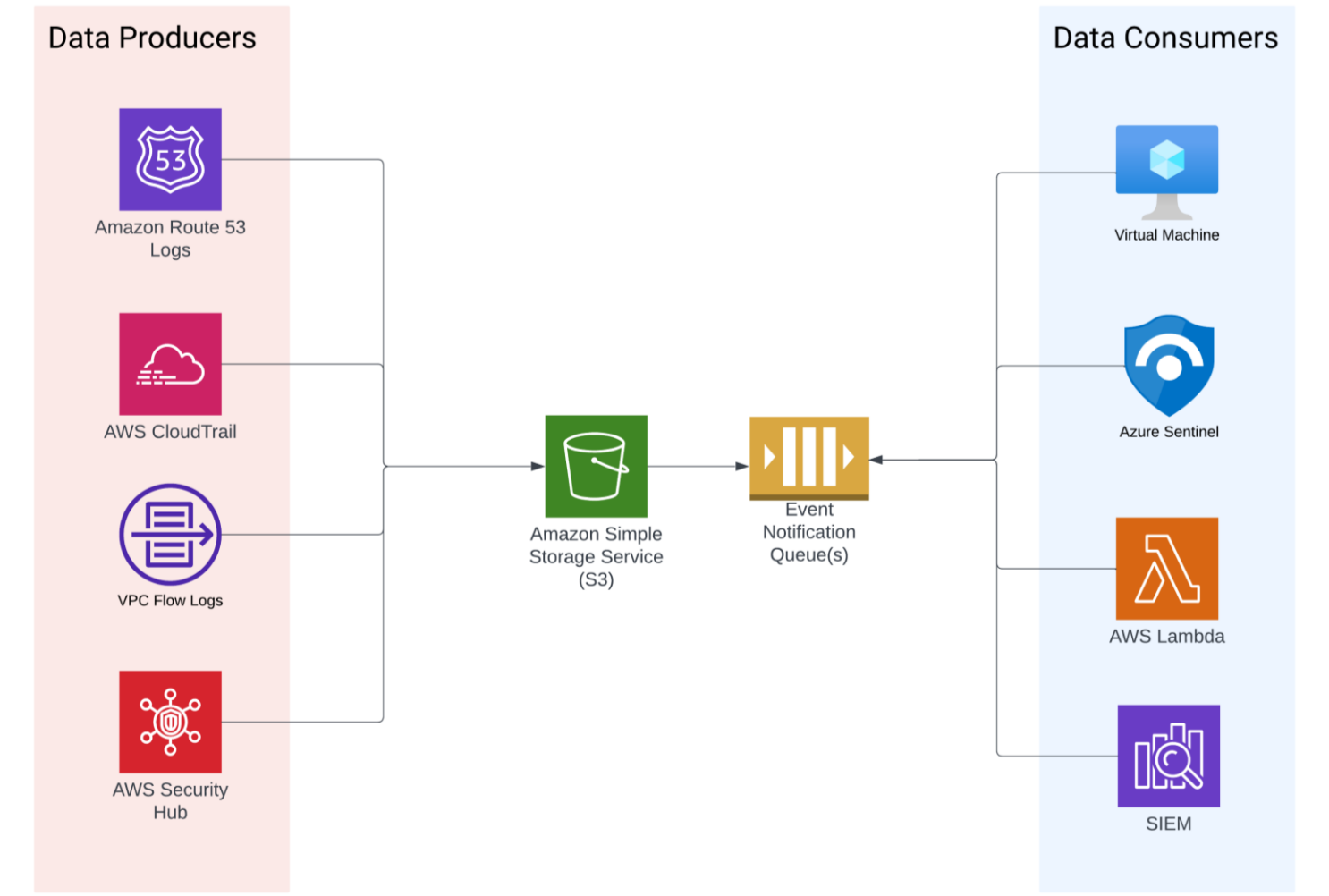
Pull Architecture

- Supports systems that do not need real-time delivery using periodic updates
- Allows the receiver to control how often data is pulled into the designation
- Increases overhead for the sender and can introduce latency receiving the data
- Lower complexity with a simpler implementation

AWS: Kinesis Log Export Pattern

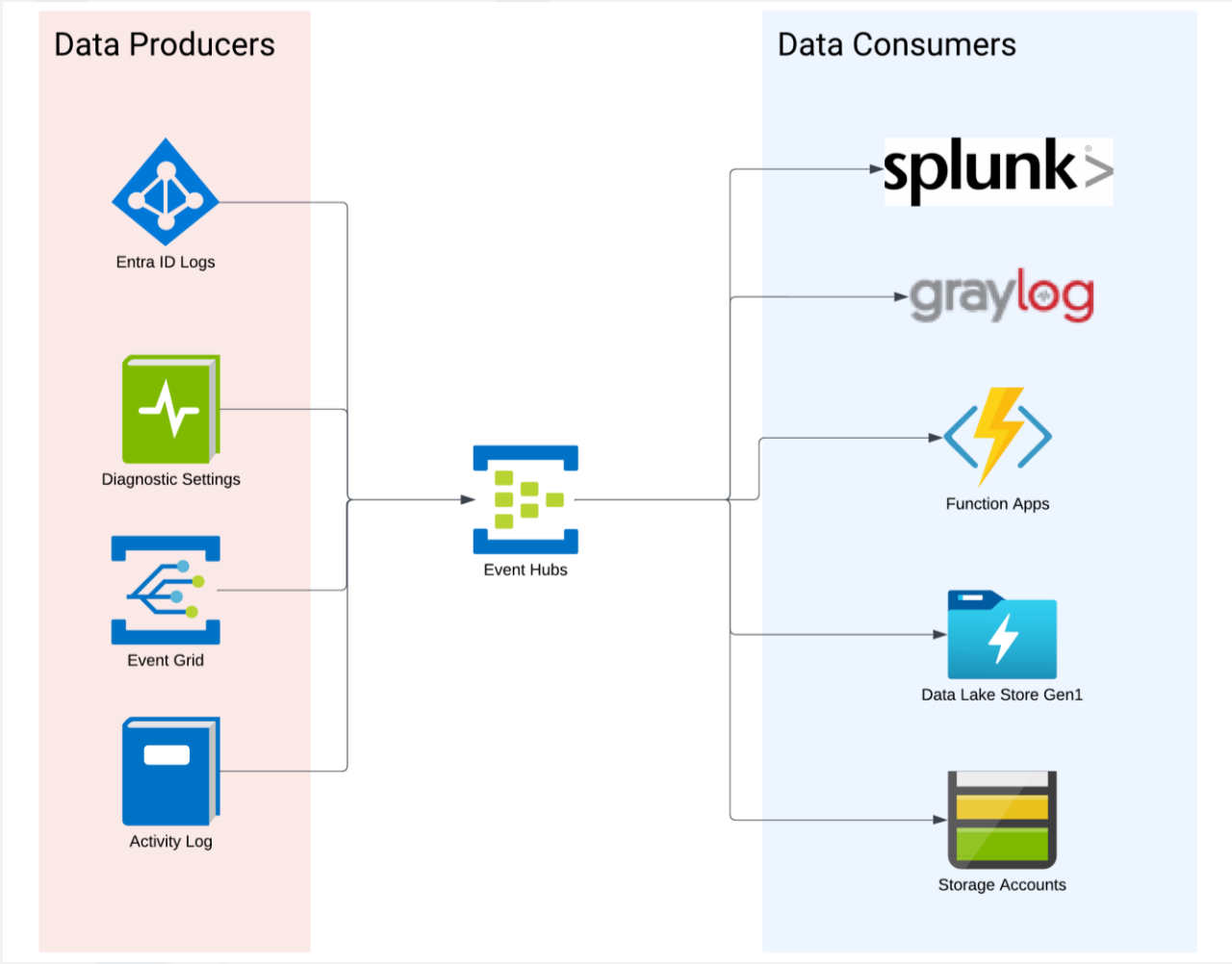
- **Kinesis Firehose** uses a push pattern to stream from data producers to data consumers in near real time.
- **Kinesis Data Streams** stores and shards data and makes available to consumers using a pull pattern.

AWS: S3 / SQS Log Export Pattern



- **Data Producers** write log data into a central S3 bucket with event notifications sending messages to an SQS queue.
- **Data Consumers** poll the queue(s) for new messages and then pull the new log objects from the S3 bucket.

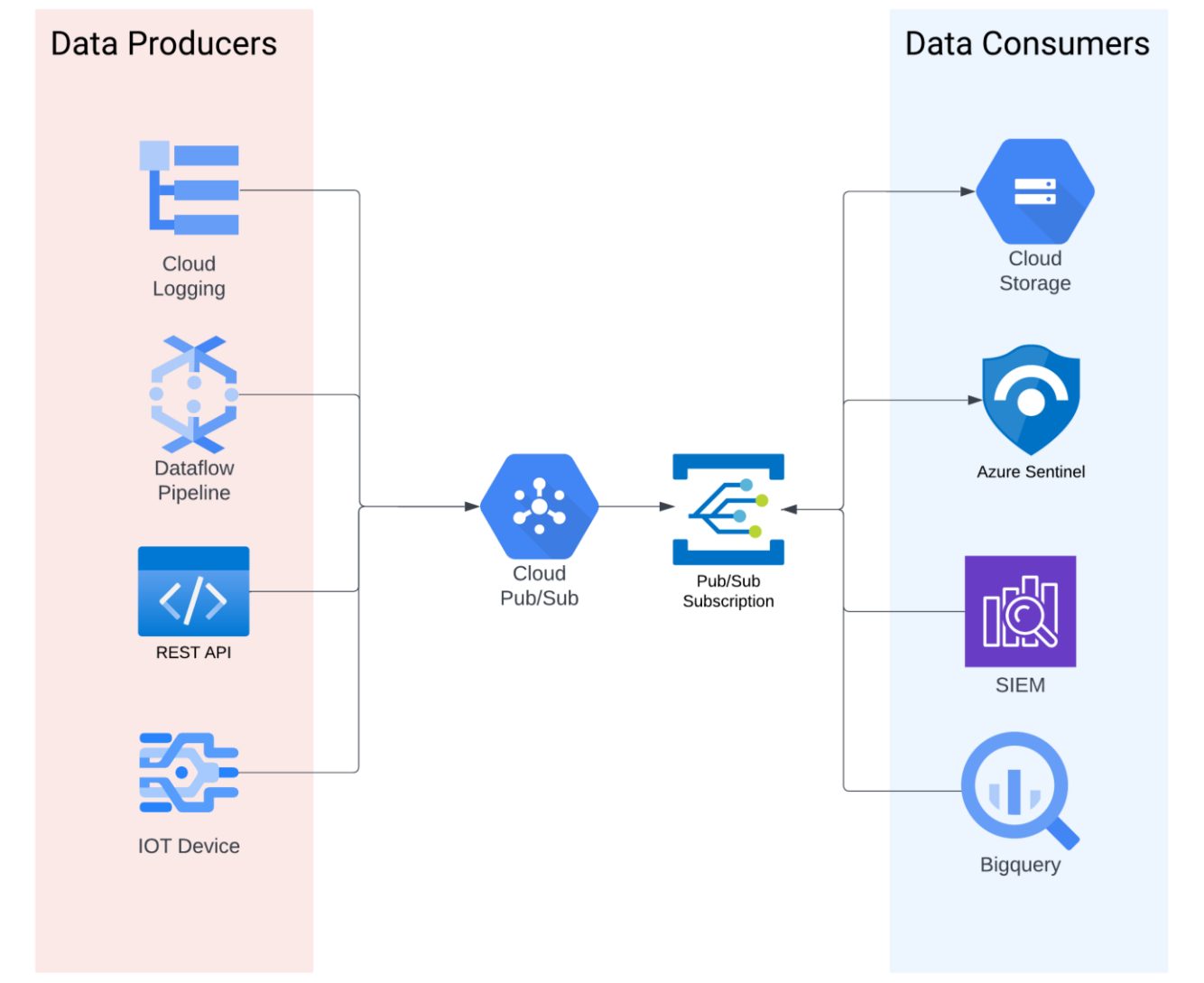
Azure: Event Hub Log Export Pattern



- **Data Producers** inside the root management group send events and log data to the **Azure Event Hub**.

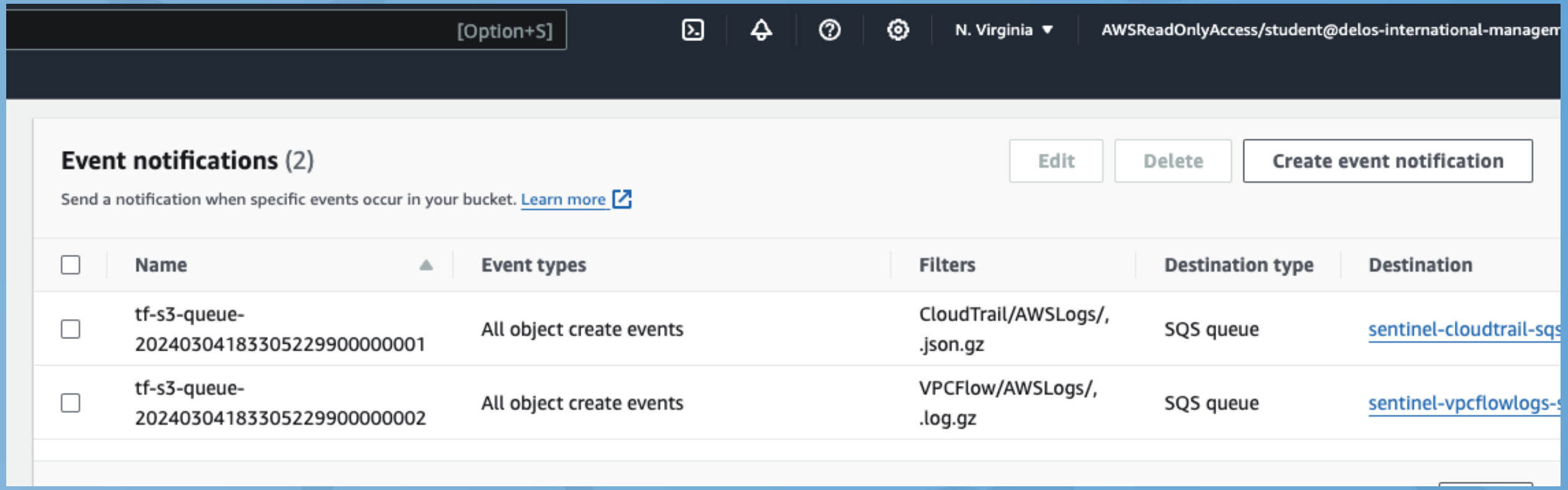
- **Data Consumers** subscribed to the Event Hub **receive** data over the Advanced Message Queuing Protocol (AMQP).

Google Cloud: Pub/Sub Log Export Pattern



- **Data Producers** write data into a Google Cloud Pub/Sub topic.
- **Data Consumers** subscribe to the Pub/Sub topic using either a push or a pull architecture to process messages as they become available.

Demo: Cross-Cloud Data Aggregation



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Microsoft Sentinel

Cloud Provider SIEM Services

Cloud providers also offer SIEM platforms for customers:

AWS: Security Lake / Glue/ Lambda / S3

- No one offering that could be called a cloud-native SIEM and SOAR.
- Instead, AWS has taken the microservices approach of providing the various capabilities of a SIEM (data storage, analytics, ingestion).

Azure: Sentinel

- Cloud-Native SIEM and SOAR
- Direct Competitor to Google Cloud Chronicle
- Natively stream security alerts from Microsoft Defender for Cloud into Microsoft Sentinel

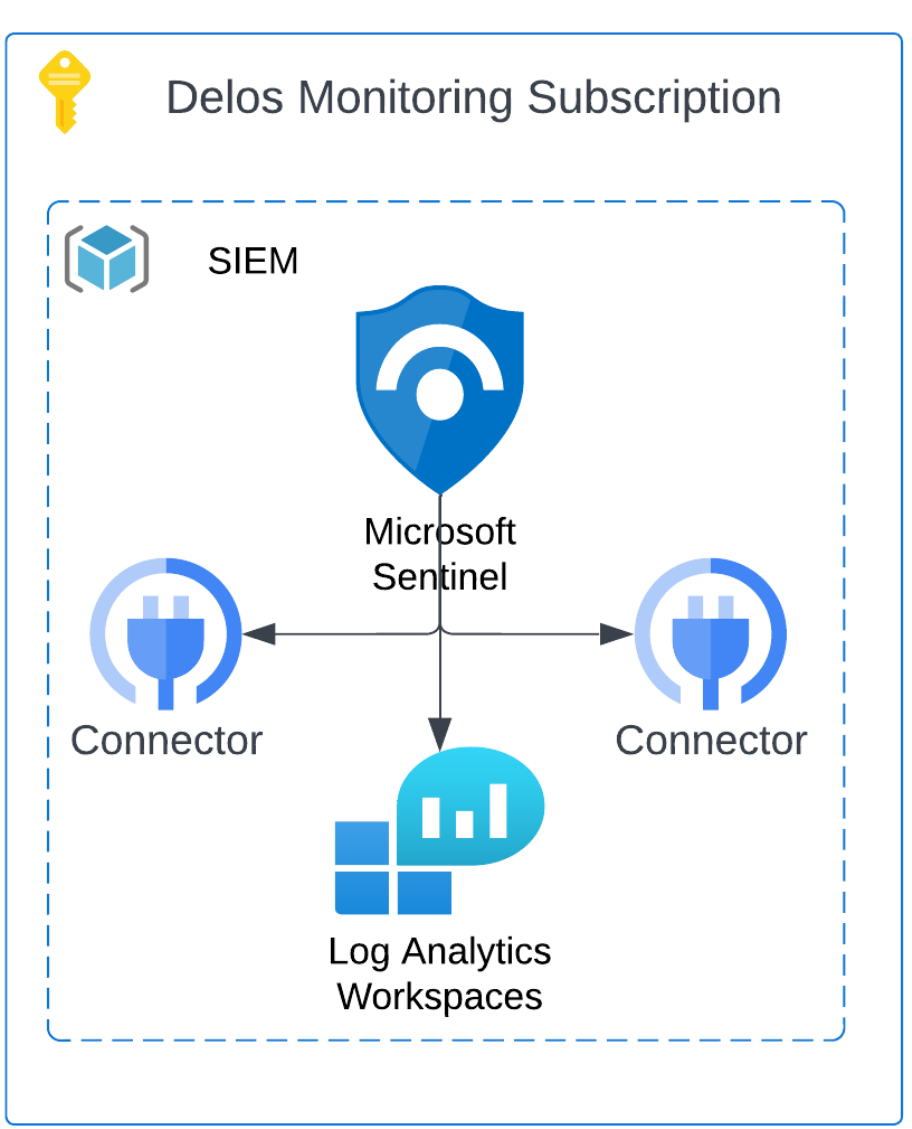
GCP: Chronicle

- Cloud-Native SIEM and SOAR
- Native analytics tools such as Looker
- Direct competitor to Azure Sentinel

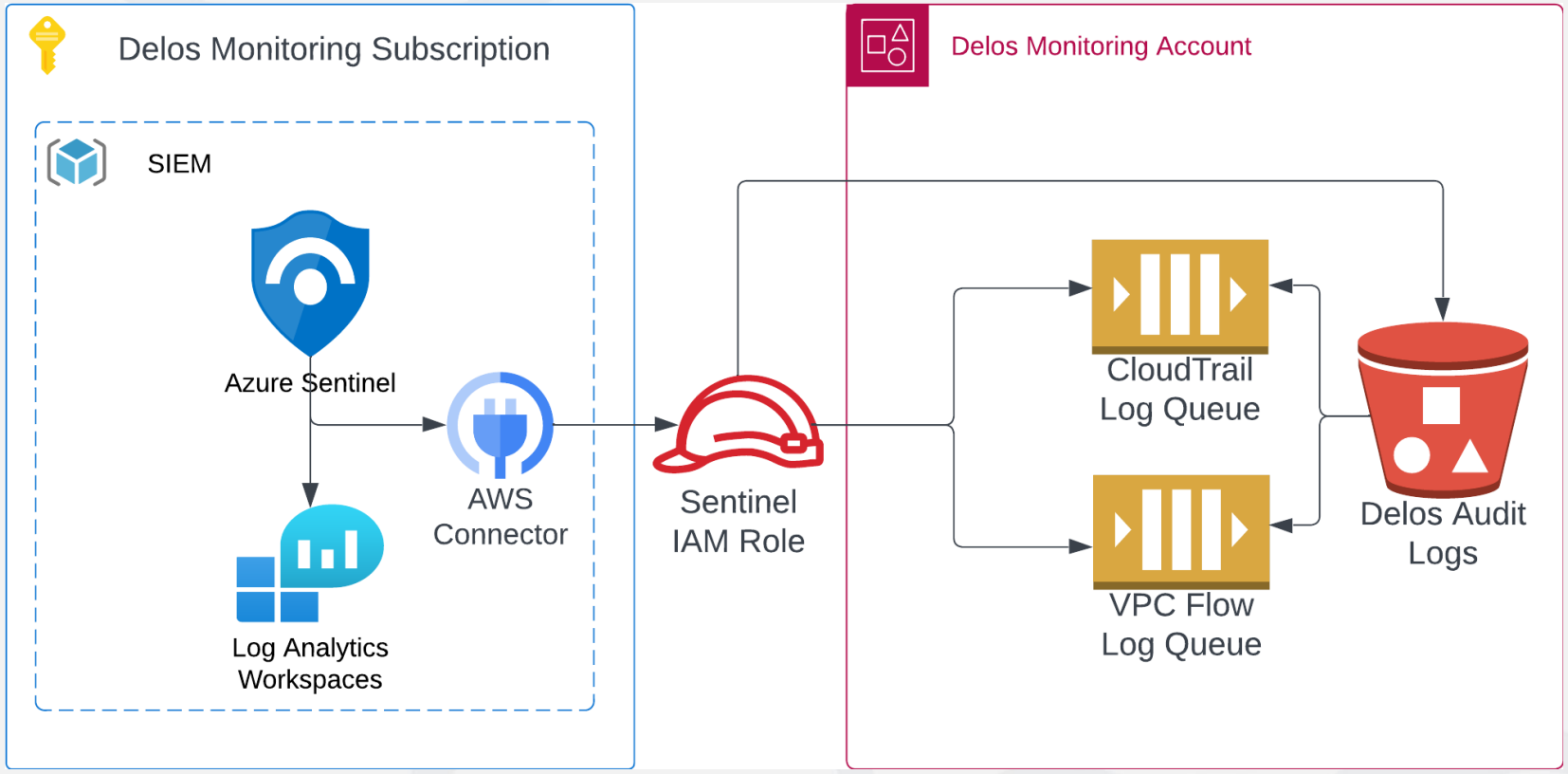
Microsoft Sentinel SIEM / SOAR Platform

Microsoft Sentinel provides a managed platform for cross-cloud and hybrid security analytics and threat intelligence:

- Extends the capabilities of the centralized log analytics workspace
- Data connectors ingest data from various sources (Entra ID, Defender for Cloud, AWS, Google Cloud, etc.)
- Discovers threats using behavior analysis, threat intelligence feeds, and predefined / custom queries
- Manages incident lifecycle for alerts, triage, response, and resolution



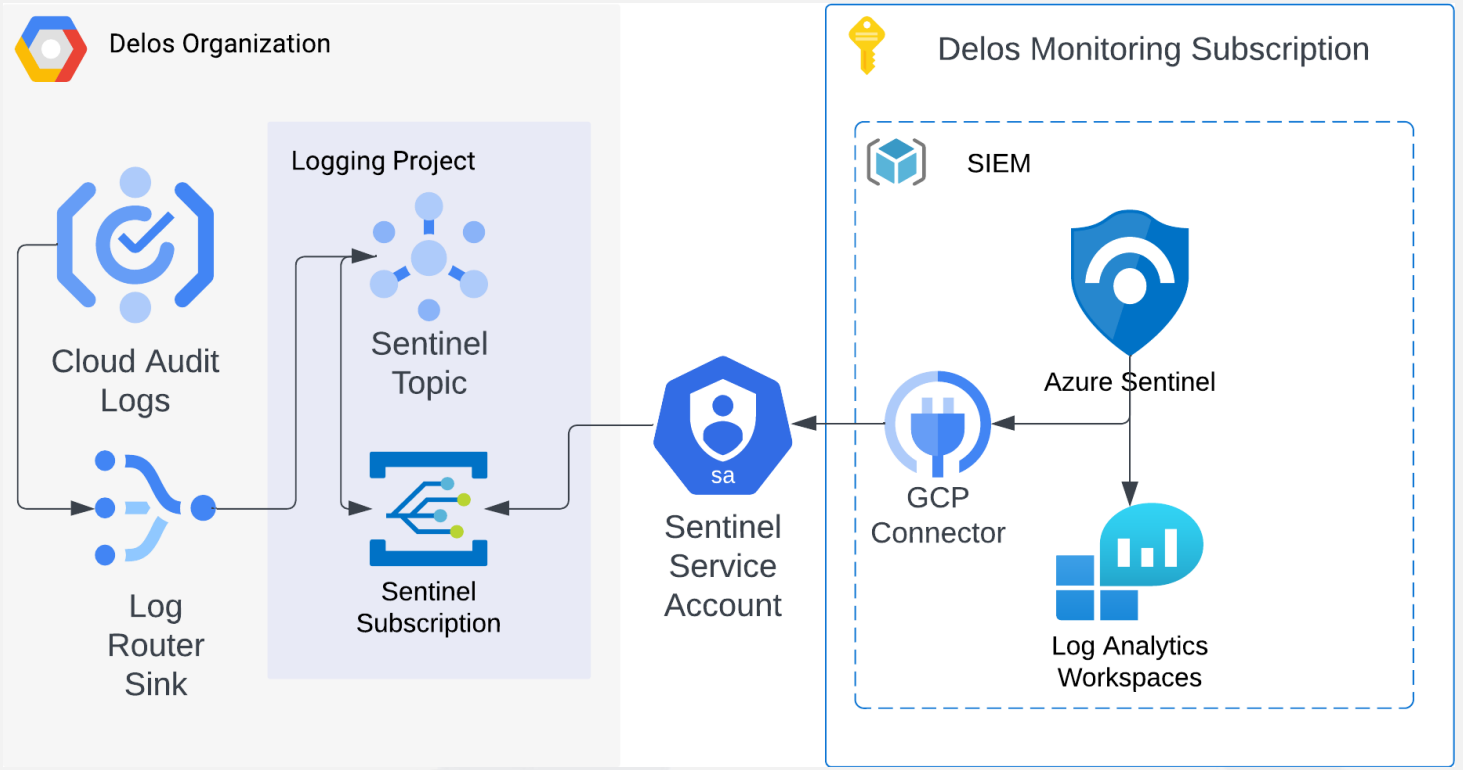
Microsoft Sentinel: Ingesting AWS Logs with SQS and S3



- **AWS monitoring account resources:**
  - Create a queue for each log type
  - Configure an S3 event notification per log type prefix
  - Create an IAM Role that trusts the Sentinel tenant and workspace id
- **Sentinel workspace resources:**
  - Data connector for each log type assumes the IAM role and checks the queue
  - Pulls new objects from the audit log bucket into the Sentinel workspace

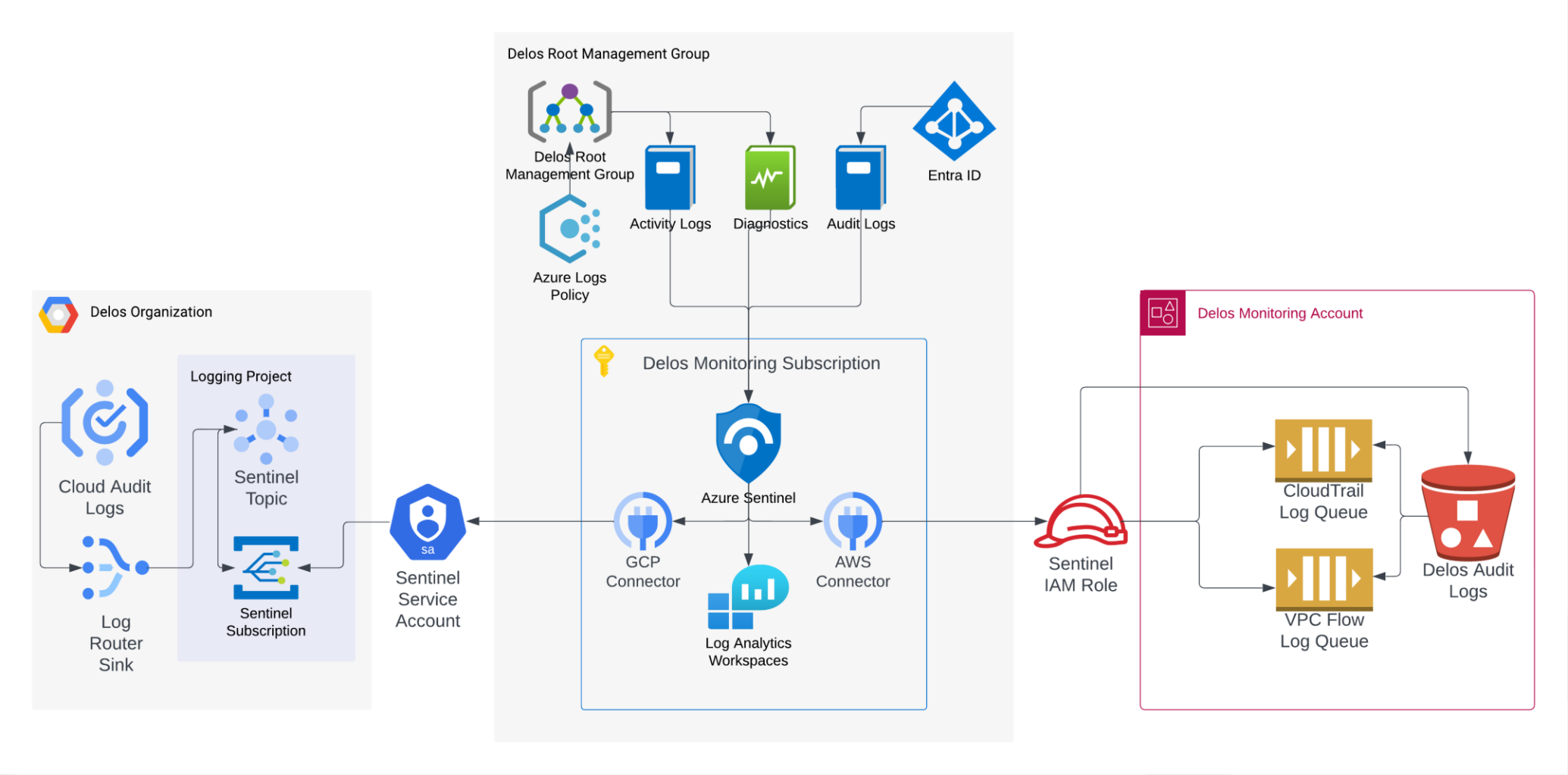
Microsoft Sentinel: Ingesting Google Cloud Logs

- **Google Cloud monitoring project account resources:**
  - Create a cloud logging sink for audit logs to stream to a Pub/Sub topic
  - Create a Pub/Sub pull subscription for the Sentinel workspace
  - Create a service account that trusts the Sentinel tenant and workspace with permission to get subscription messages

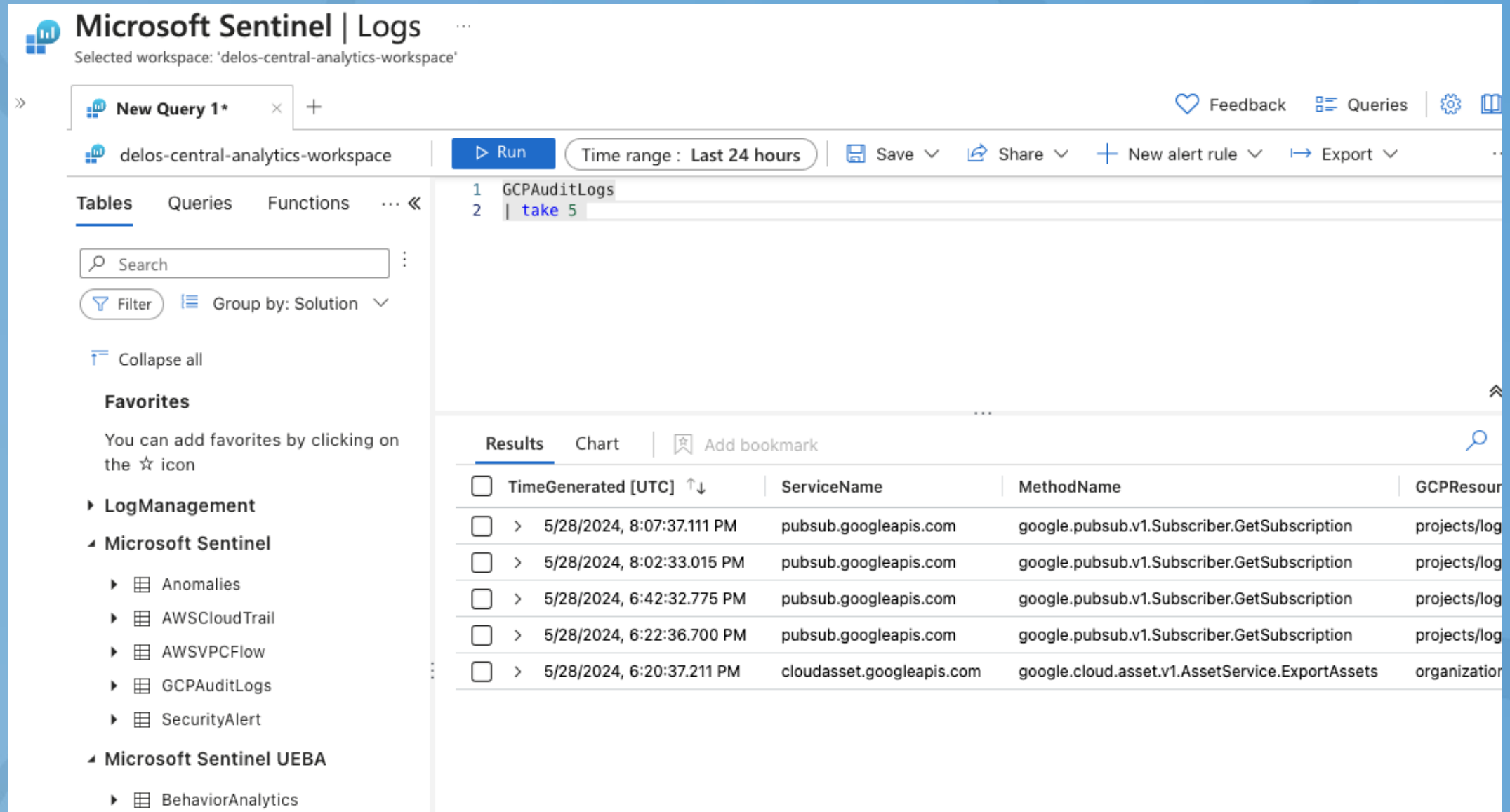


- **Sentinel workspace resources:**
  - Data connector for cloud audit logs impersonates the service account
  - Reads messages from the Pub/Sub topic's subscription

Microsoft Sentinel Centralized SIEM Architecture



Demo: Microsoft Sentinel



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Conclusions

Closing Remarks

Ingesting cross-cloud events can be complex. And expensive!

Centralize audit log data into a data lake per cloud to save on egress data transfer charges

Identify high value events for exporting to a centralized SIEM for monitoring and alerting

Read your SIEM's integration support for each cloud provider to find supported export patterns

Avoid using long-lived credentials for cross-cloud connections. Workload identity is better!

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CURRICULUM ROADMAP

Baseline

SEC 388 — **Introduction to Cloud Computing and Security**
Ground school for cloud security

Foundational Security Techniques

SEC 488 — **Cloud Security Essentials | GCLD**
License to learn cloud security.

Leadership

LDR 520 — **Cloud Security for Leaders**
Strategically maximize your cloud investment.

Core

SEC 510 — **Cloud Security Controls & Mitigations | GPCS**
Prevent real attacks with controls that matter.

SEC 540 — **Cloud Security and DevSecOps Automation | GCSA**
The cloud moves fast. Automate to keep up.

SEC 541 — **Cloud Security Threat Detection | GCTD**
Attackers can run but not hide. Our radar sees all threats.

SEC 549 — **Cloud Security Architecture**
Design it right from the start.

Specialization

SEC 522 — **Application Security: Securing Web Apps, APIs, and Microservices | GWEB**
Not a matter of "if" but "when." Be prepared for a web attack. We'll teach you how.

SEC 588 — **Cloud Penetration Testing | GCPN**
Aim your arrows to the sky and penetrate the cloud.

FOR 509 — **Enterprise Cloud Forensics and Incident Response | GCFR**
Find the storm in the cloud.

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