

# Deploying and Invoking Background Cloud Functions

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# Overview

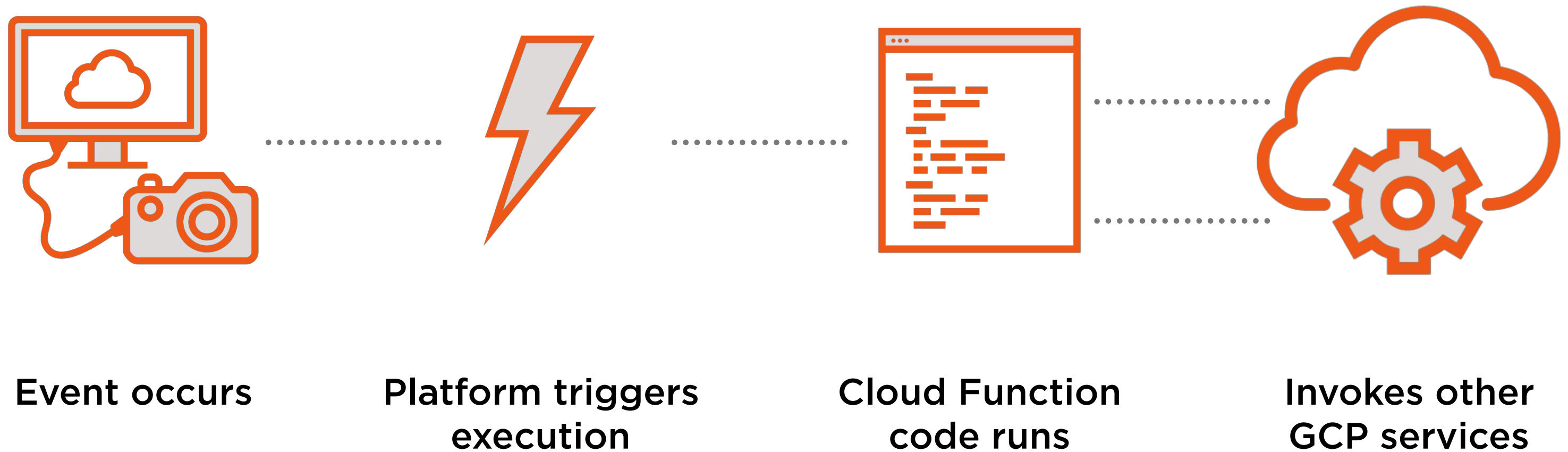
**Function triggers, data and context**

**Background functions in Python**

**Deploying and invoking background functions**

**Triggering background functions using Cloud Storage and Pub/Sub**

# Event-driven Serverless Compute



# Event-driven Serverless Compute



**Event occurs**



Platform triggers  
execution



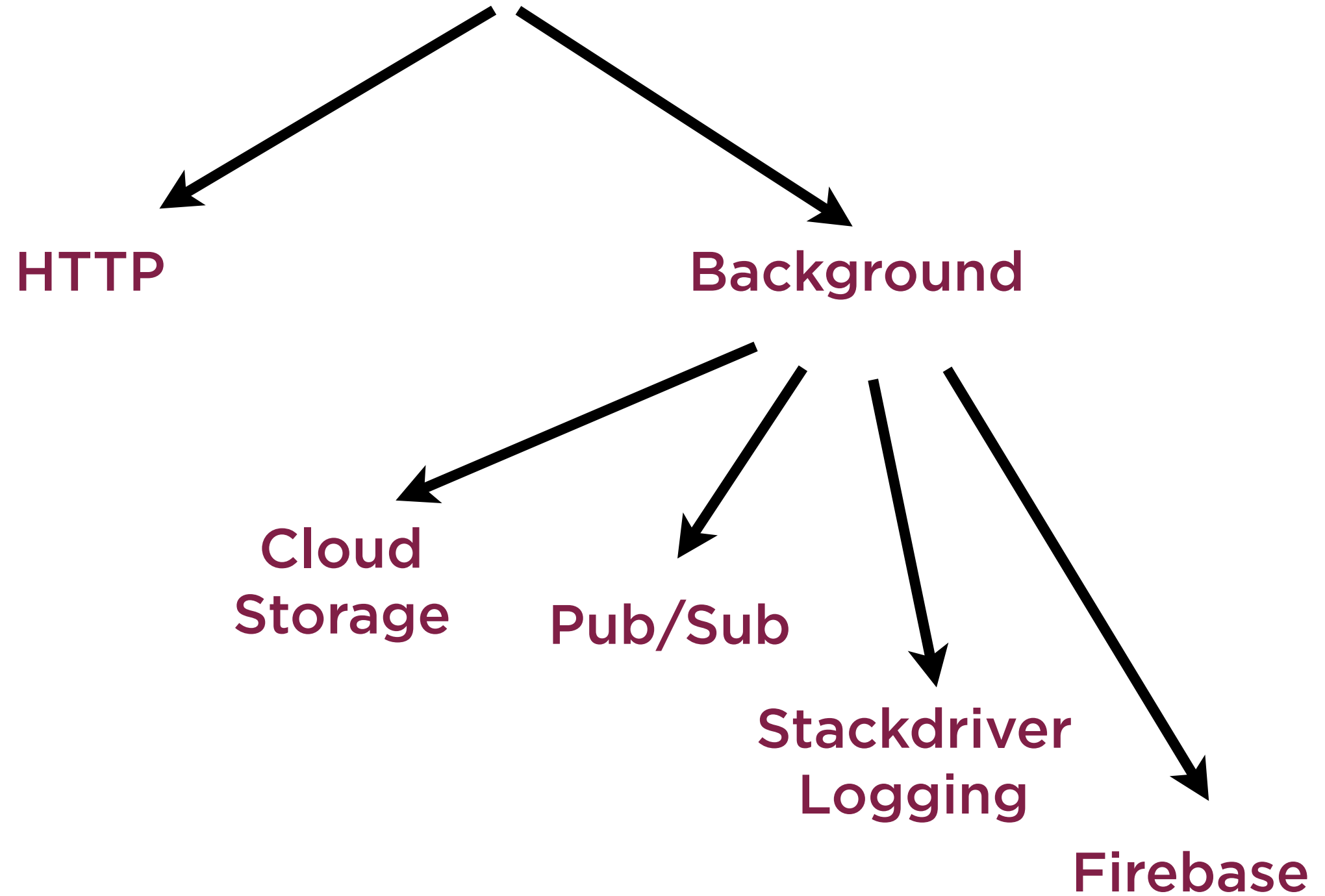
Cloud Function  
code runs



Invokes other  
GCP services

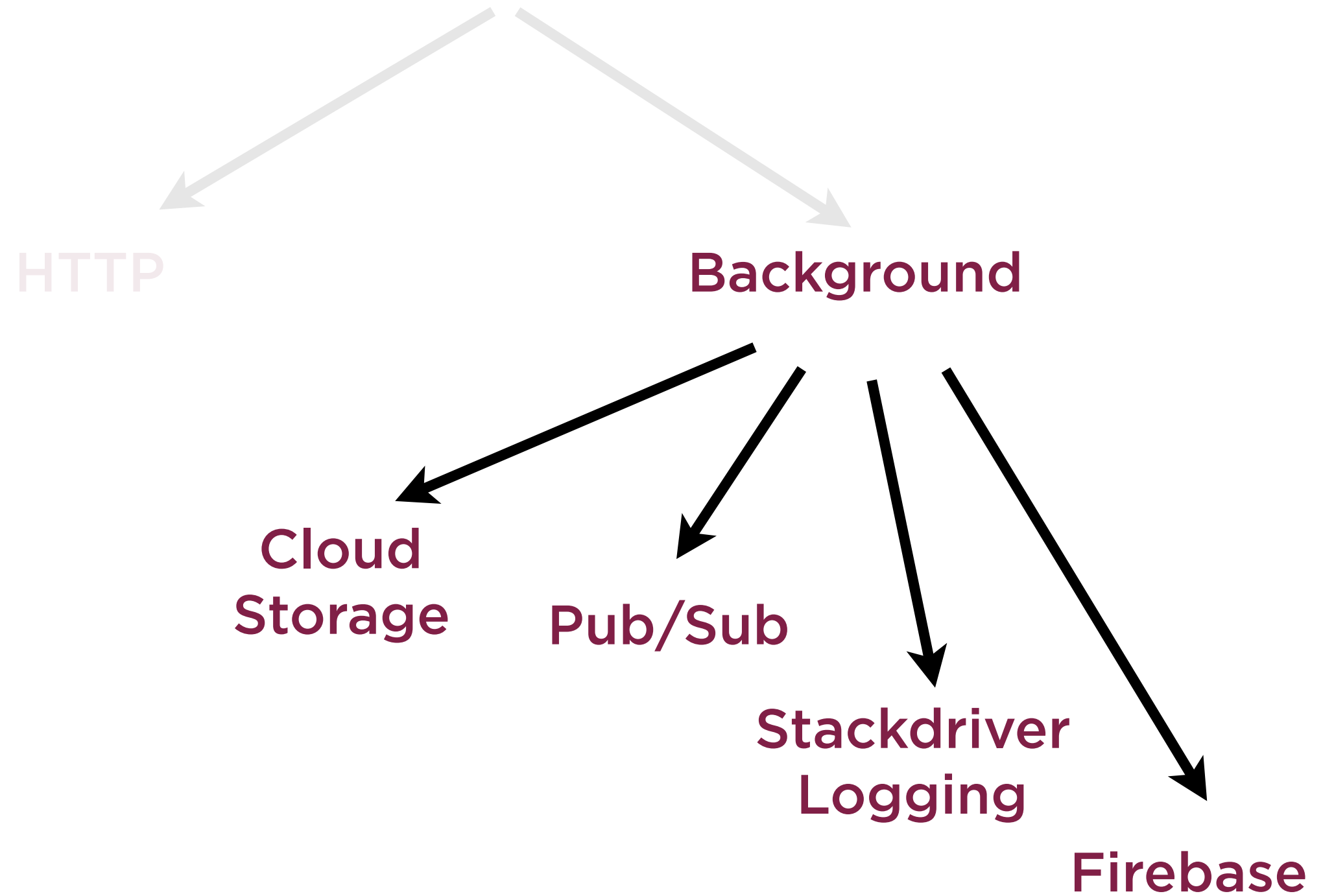


# Types of Events



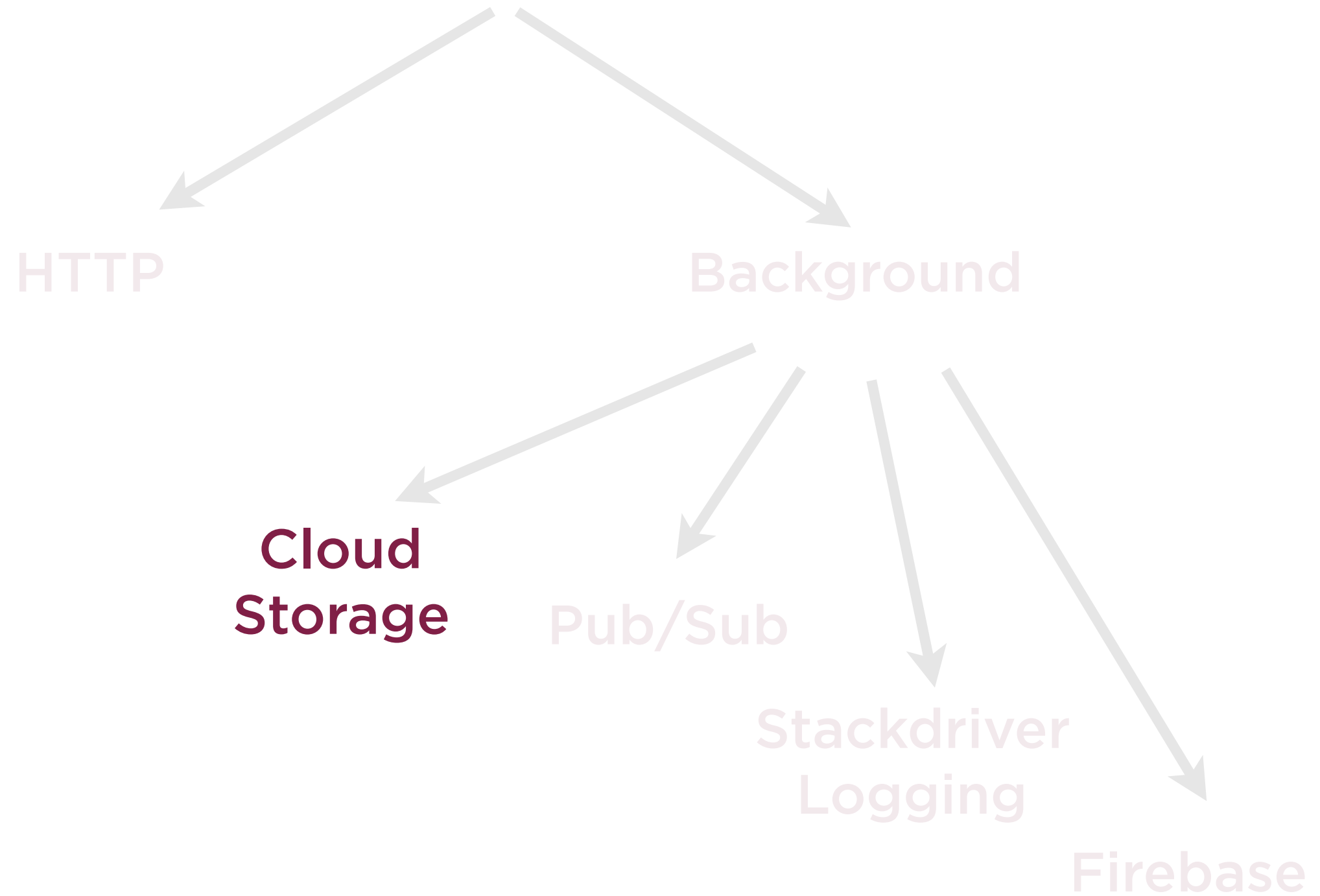


# Types of Events





# Types of Events





**Cloud storage notifications can trigger cloud functions**

**Currently supported trigger types**

- Object finalize
- Object delete
- Object archive
- Object metadata update





## Two mechanisms of event delivery

- (Standard) Pub/Sub notifications from Cloud Storage
- (Legacy) Object change notifications on specific bucket

# Cloud Storage Notifications

`google.storage.object.finalize`

`google.storage.object.delete`

`google.storage.object.archive`

`google.storage.object.  
metadataUpdate`

## Object Finalize

Trigger type value: `google.storage.object.finalize`

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This event is sent when a new object is created (or an existing object is overwritten, and a new generation of that object is created) in the bucket.

## Object Delete

Trigger type value: `google.storage.object.delete`

This event is sent when an object is permanently deleted. Depending on the [object versioning setting for a bucket](#) this means:

- For versioning buckets, this is only sent when a version is permanently deleted (but not when an object is archived).
- For non-versioning buckets, this is sent when an object is deleted or overwritten.

## Object Archive

Trigger type value: `google.storage.object.archive`

This event is sent when a [live version of an object](#) is archived or deleted.

This event is only sent for [versioning buckets](#).

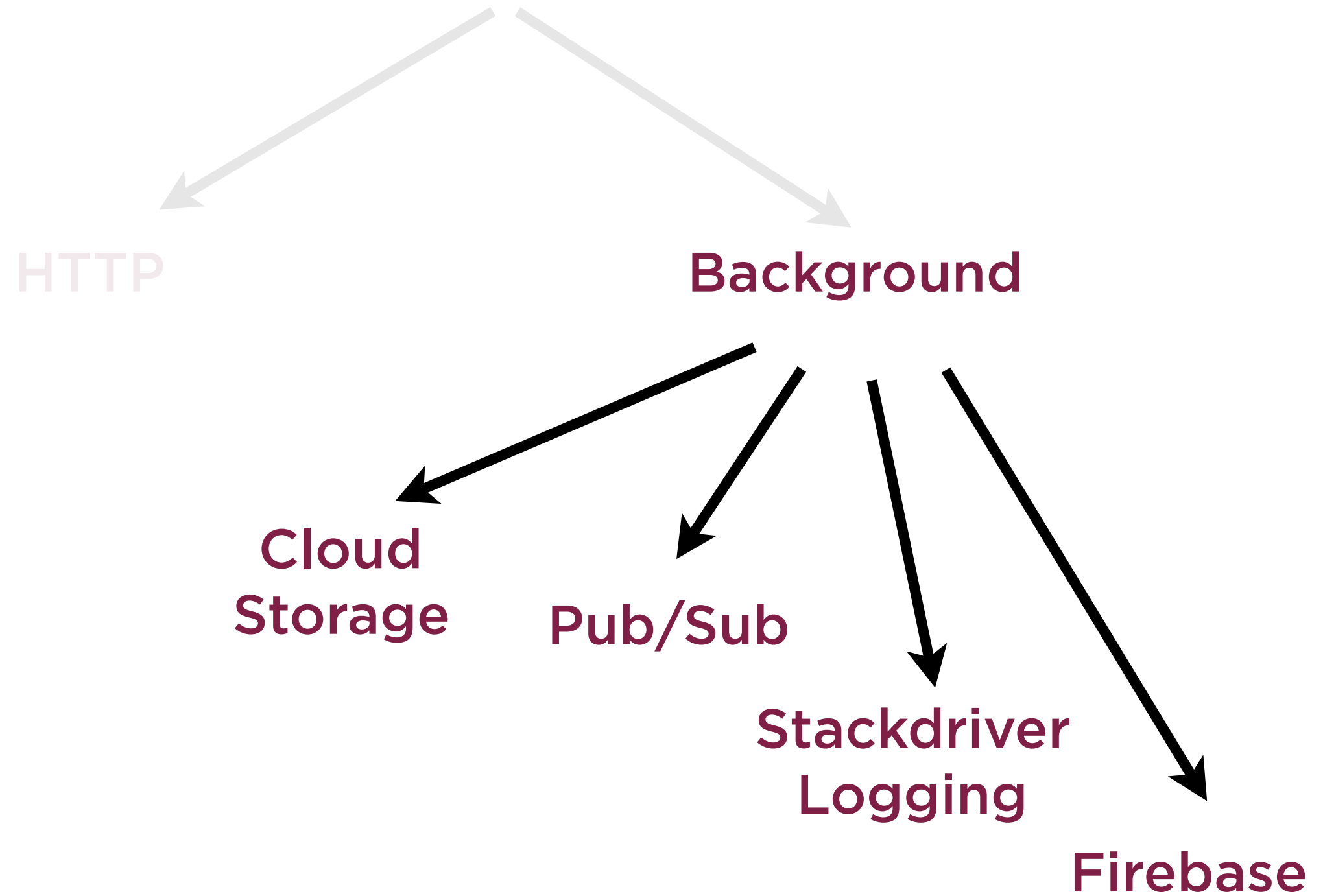
## Object Metadata Update

Trigger type value: `google.storage.object.metadataUpdate`

This event is sent when the [metadata](#) of an existing object changes.

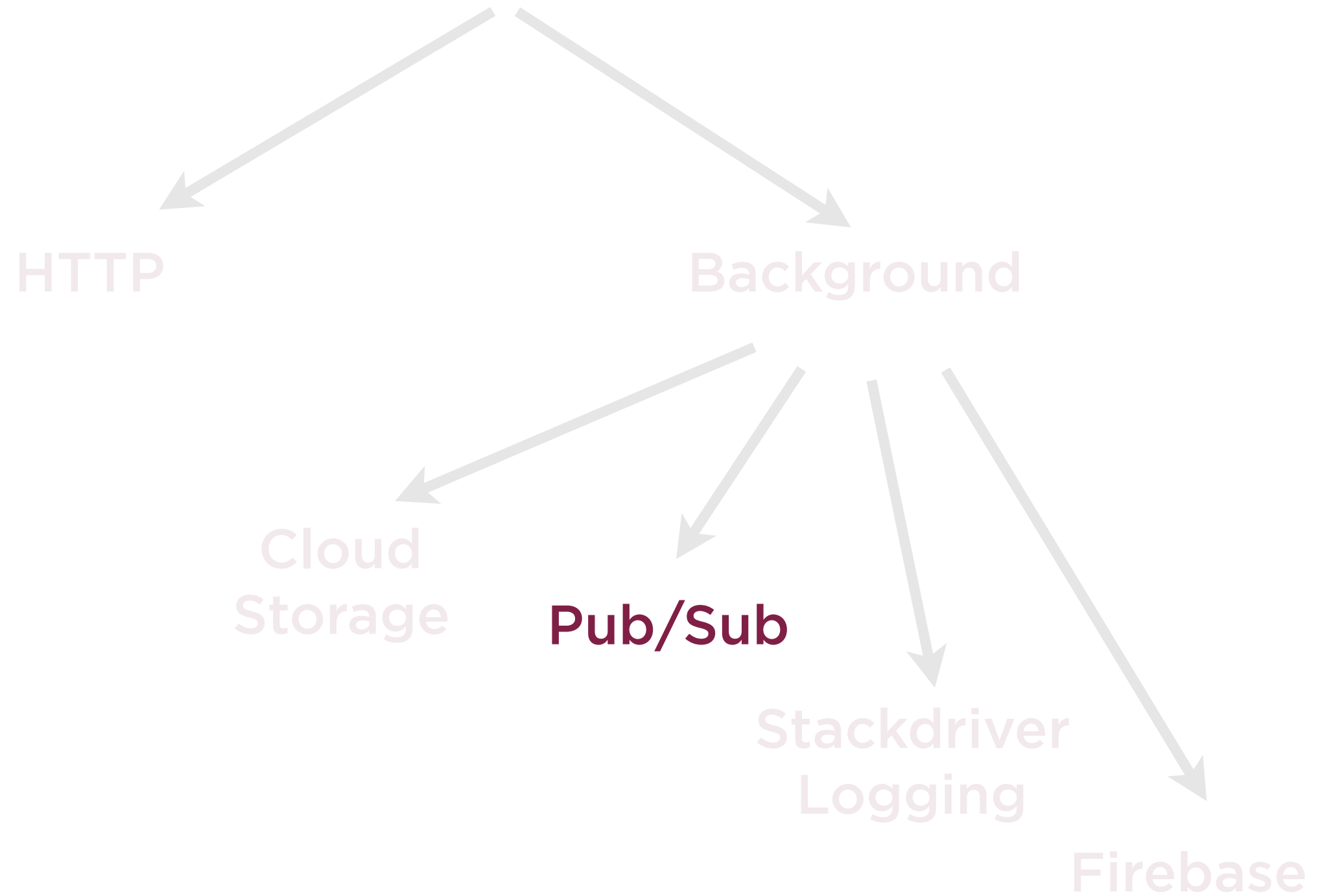


# Types of Events





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**Pub/Sub is GCP publisher-subscriber messaging service**

**Globally distributed, reliable, scalable**

**Pub/Sub abstractions**

- Publisher
- Subscriber
- Topic
- Message



**Cloud Functions can be triggered by messages**

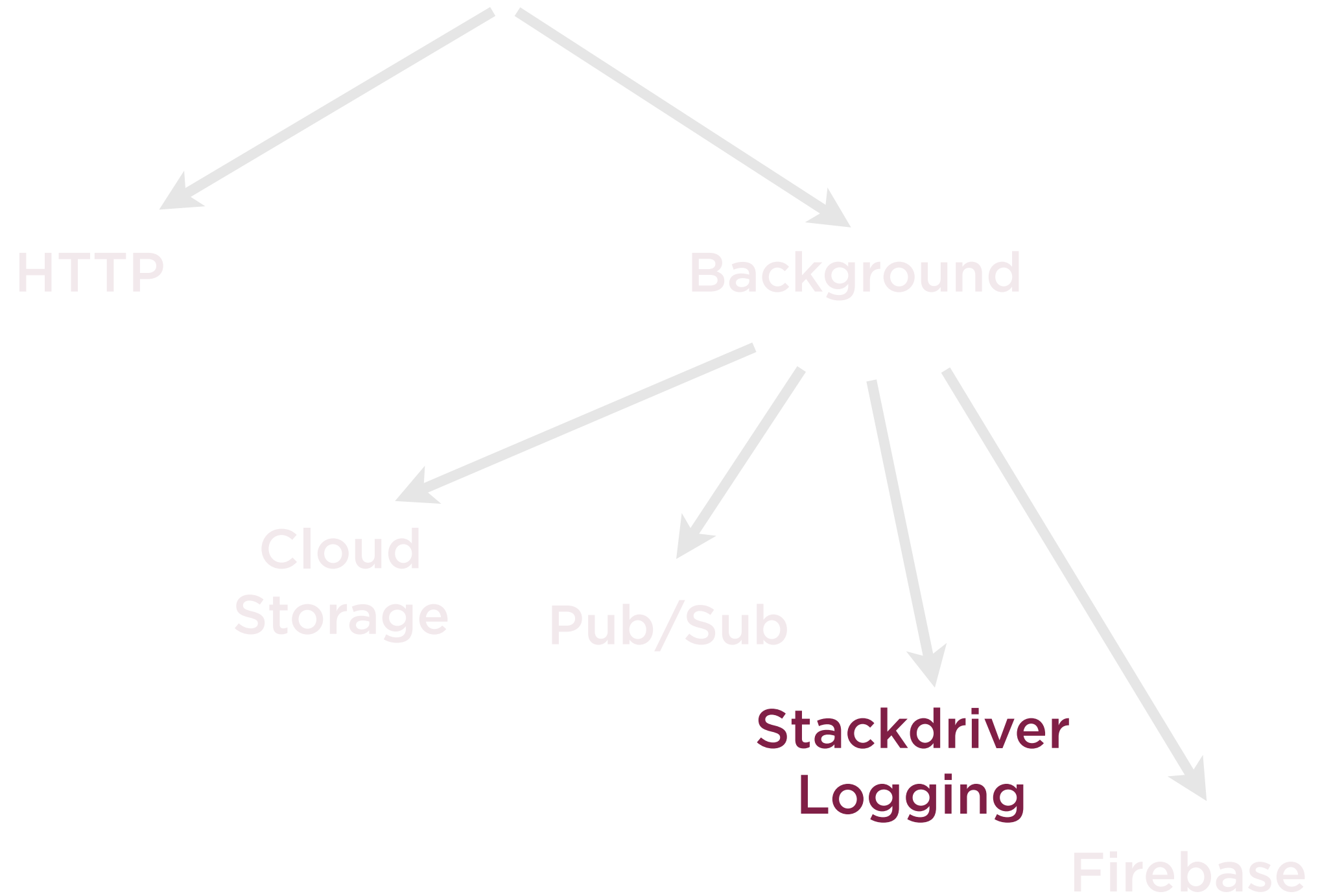
**Cloud Function must subscribe to specific topic**

**Messages on that topic will trigger function**

**Topic and Cloud Function must be in the same project**



# Types of Events







## Stackdriver Audit Logs

- Store virtually all types of GCP events

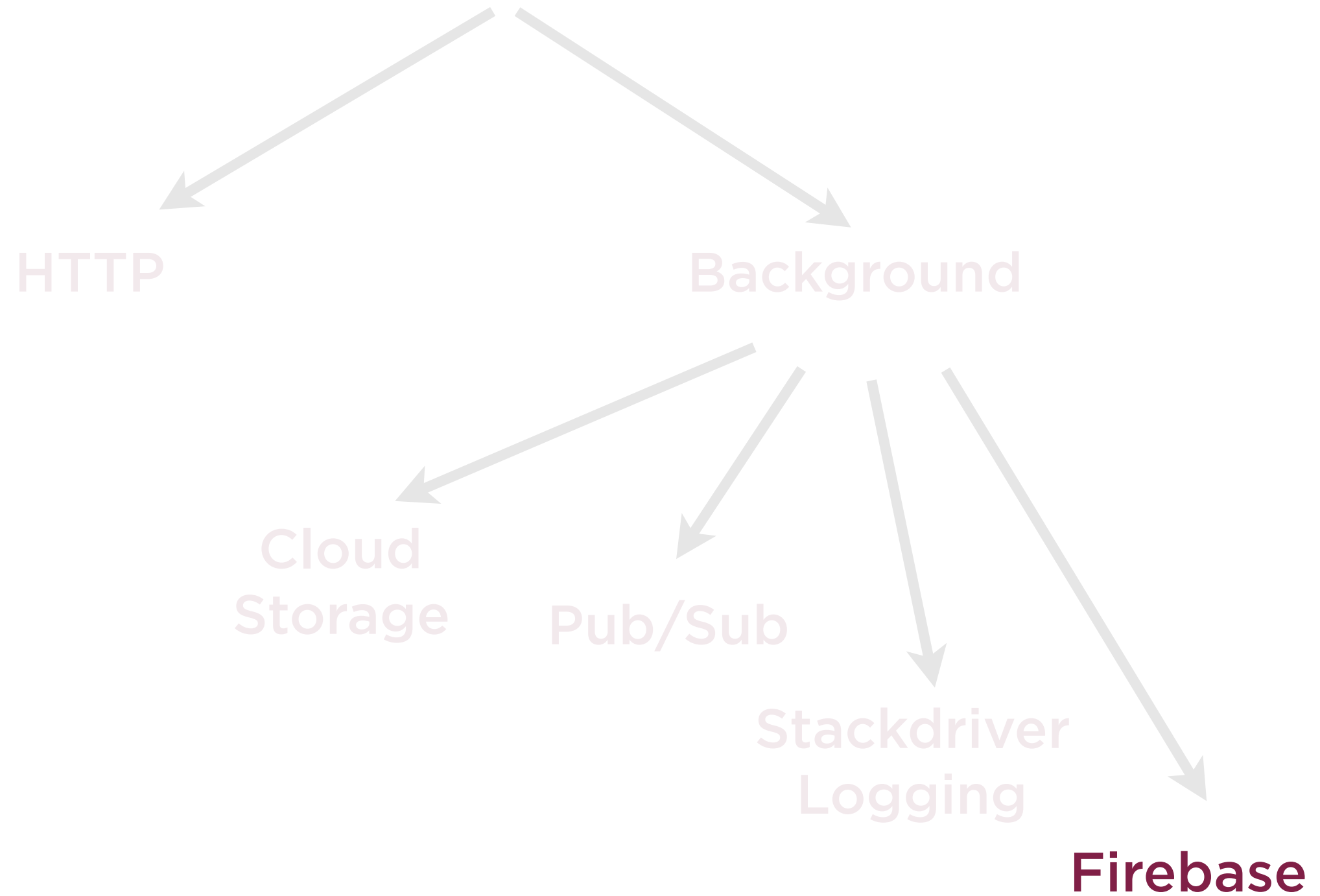
**Typically, log entries are filtered and forwarded**

- For reasons of cost
- To Pub/Sub sinks

**Simply wire Pub/Sub topic to notify Cloud Function**



# Types of Events





## **Firebase suite of products for mobile and web development**

### **Cloud Function triggers from**

- Firebase Authentication
- Firestore and Firebase Realtime DB
- Google Analytics for Firebase

# Demo

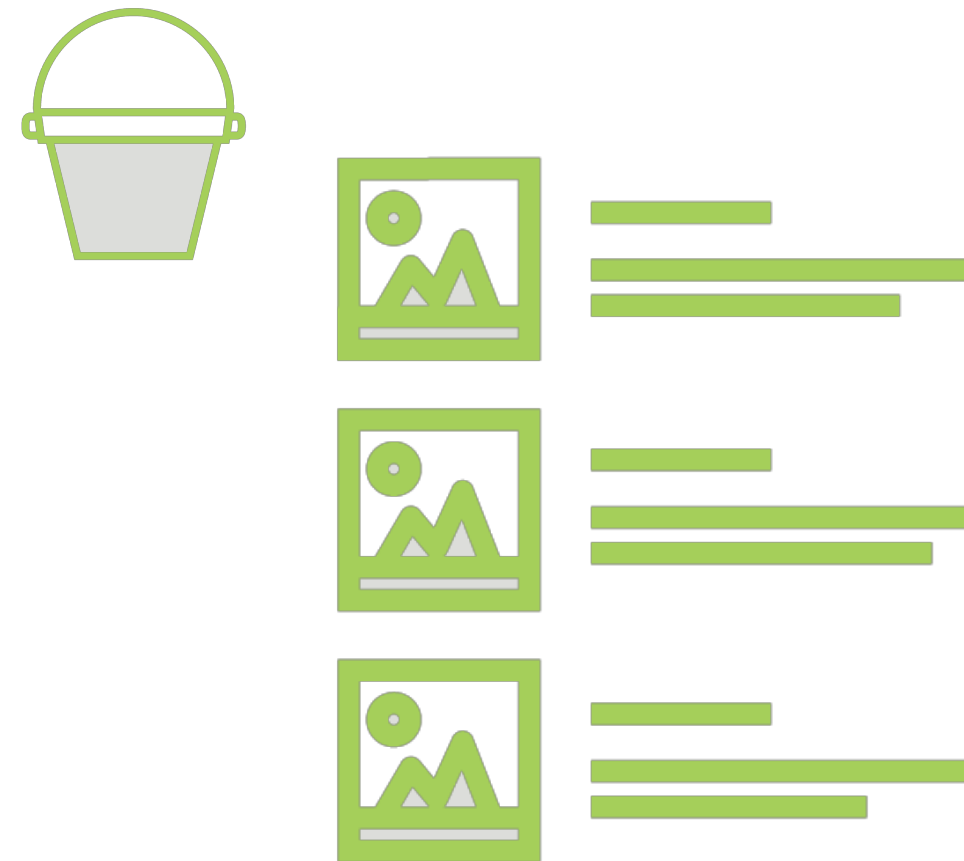
**Cloud Storage triggers**

**Image uploads in one bucket generate  
image thumbnails in another**

# Cloud Storage Event Triggers



**Use multipart data functions to upload image files to one bucket**



**Generate image thumbnails stored in another bucket**

# Cloud Storage Event Triggers



**Use multipart data functions to upload image files to one bucket**

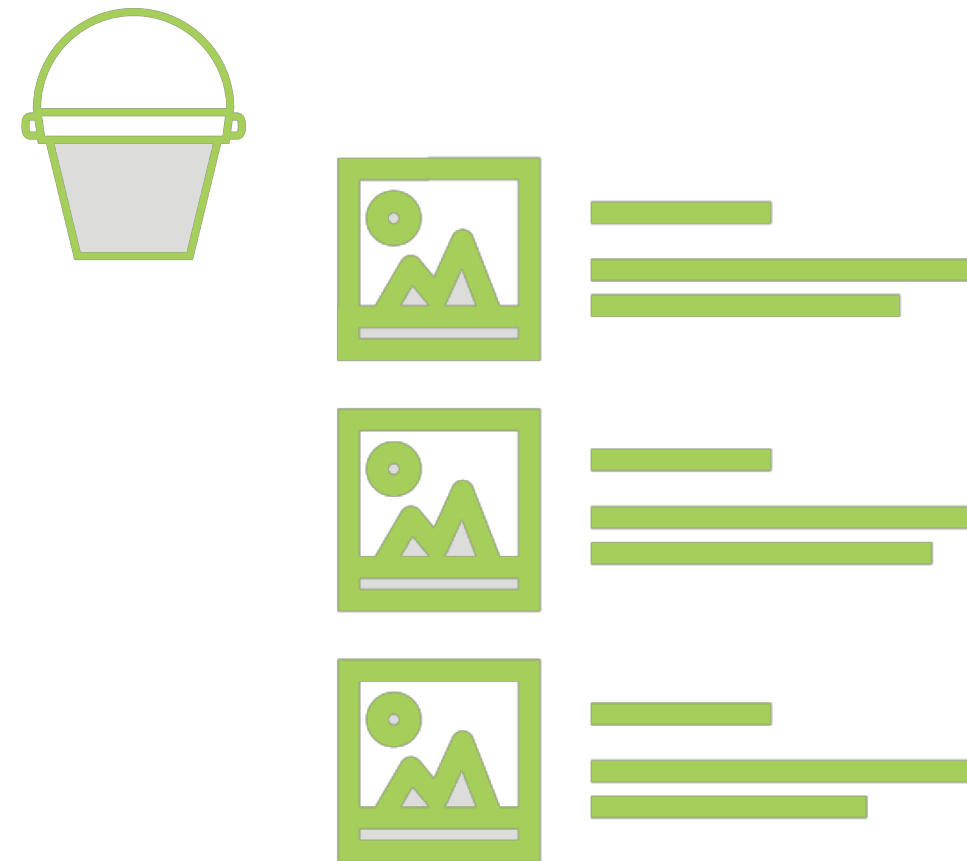


**Generate image thumbnails stored in another bucket**

# Cloud Storage Event Triggers



Use multipart data functions to  
upload image files to one bucket



**Generate image thumbnails  
stored in another bucket**

Demo

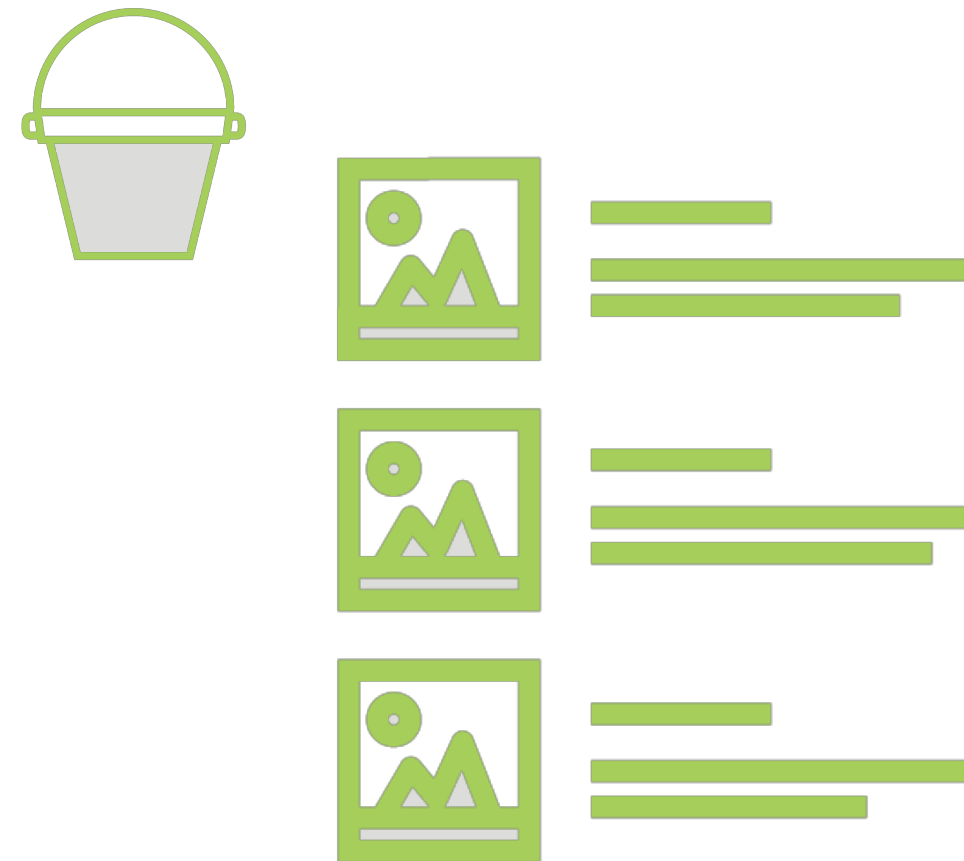
**Integrating with other GCP services**



# Cloud Storage Event Triggers



**Use multipart data functions to upload image files to one bucket**

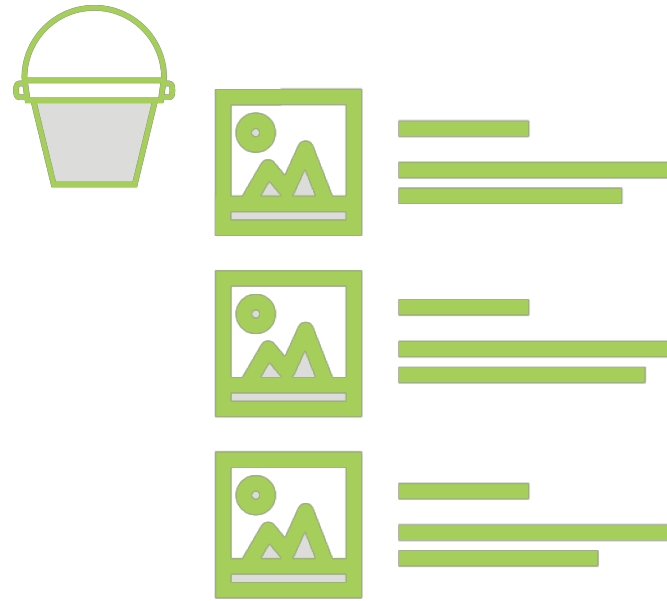


**Generate image thumbnails stored in another bucket**

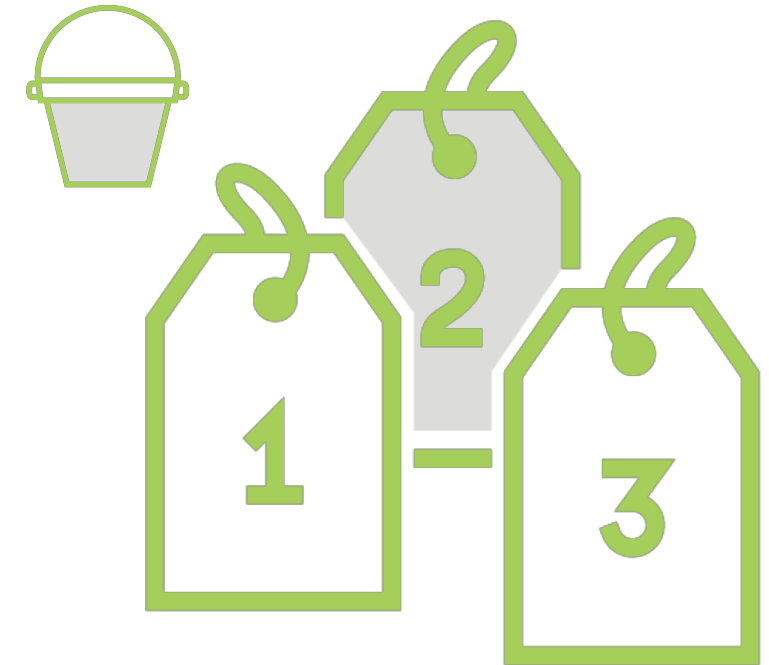
# Cloud Storage Event Triggers



**Use multipart data  
functions to upload  
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**Generate image  
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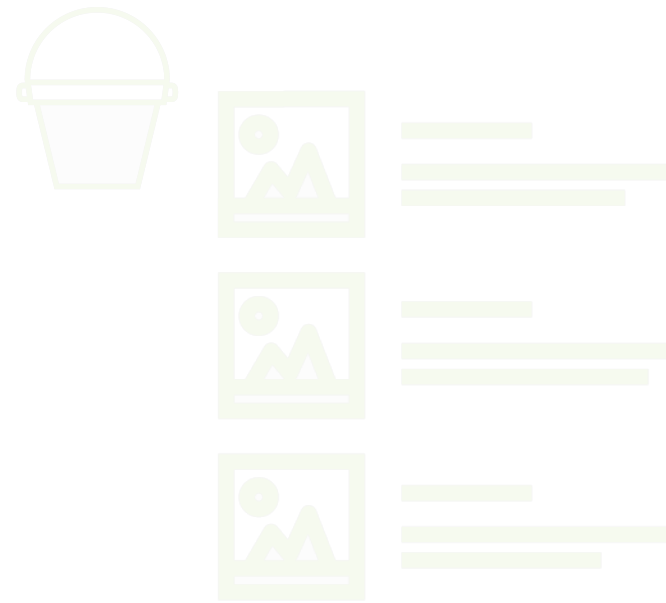


**Generate image  
annotations using Cloud  
Vision APIs**

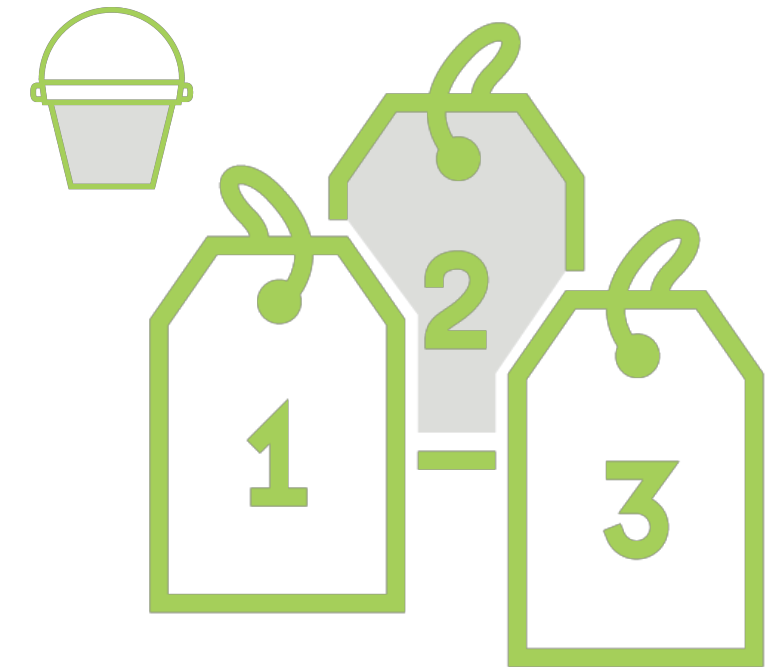
# Cloud Storage Event Triggers



Use multipart data functions to upload image files to one bucket



Generate image thumbnails stored in another bucket



**Generate image annotations using Cloud Vision APIs**

# Demo

**Integrating with Cloud Pub/Sub**

**Push seller offers to a Pub/Sub topic**

# Demo

**Trigger Cloud Functions using Pub/Sub triggers**

**Deploy functions using Cloud Source Repositories**

# Summary

**Function triggers, data and context**

**Background functions in Python**

**Deploying and invoking background functions**

**Triggering background functions using Cloud Storage and Pub/Sub**