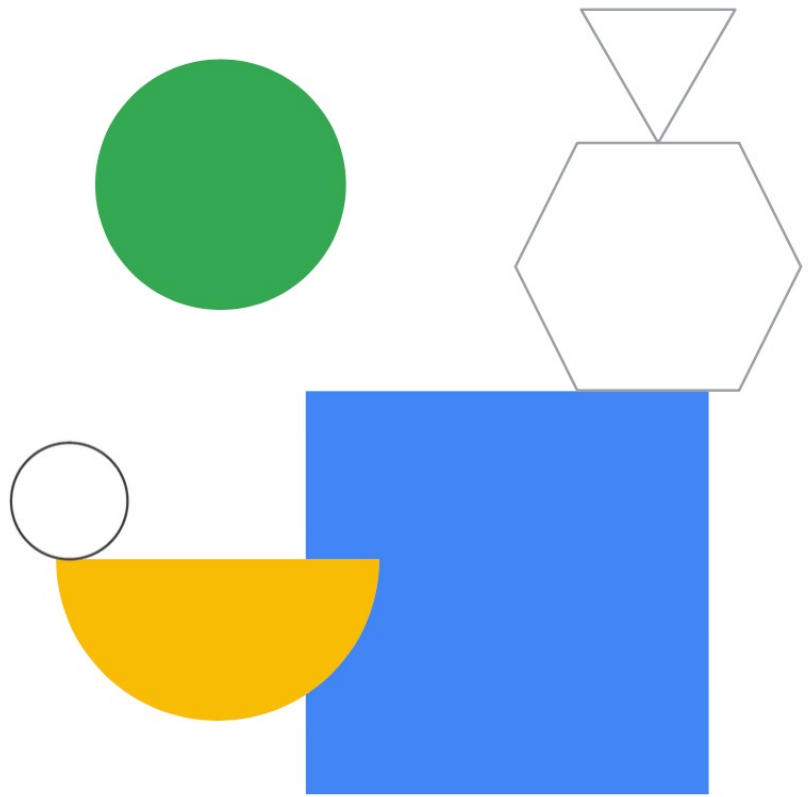
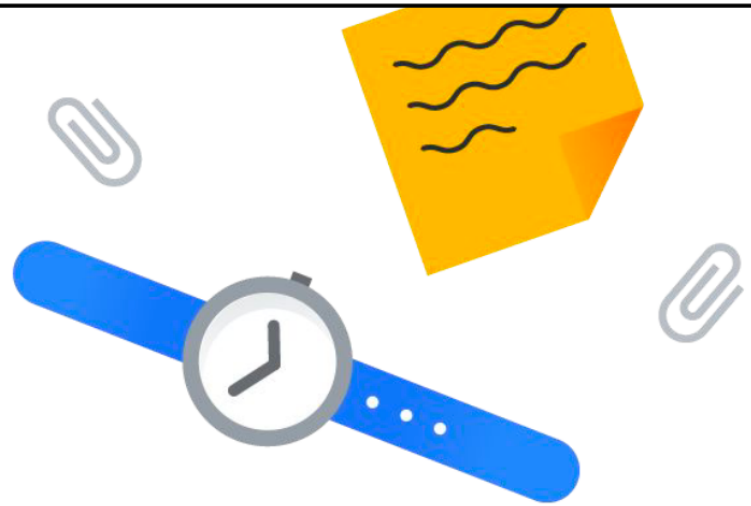
Google Cloud

Serverless Messaging with Pub/Sub





Module agenda

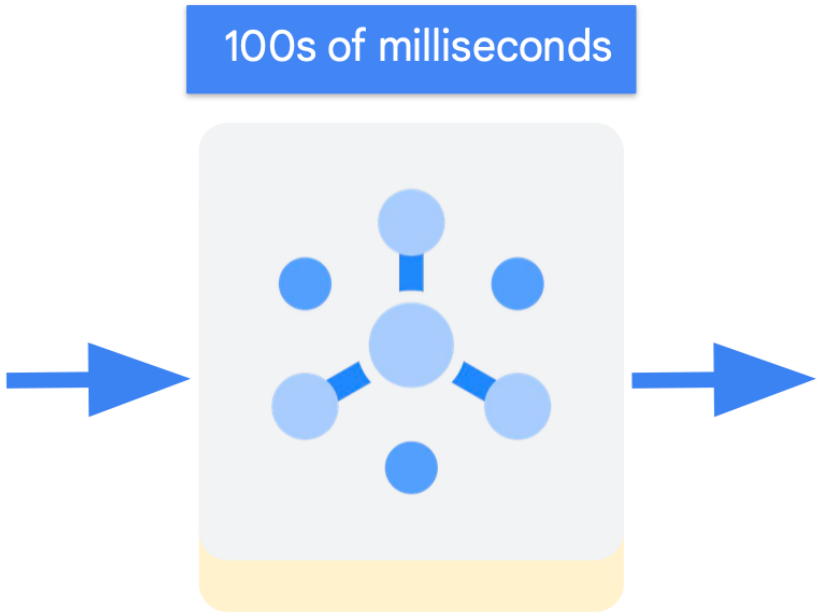
01 Introduction to Pub/Sub

02 Pub/Sub Push Versus Pull

03 Publishing with Pub/Sub Code

Introduction to Pub/Sub

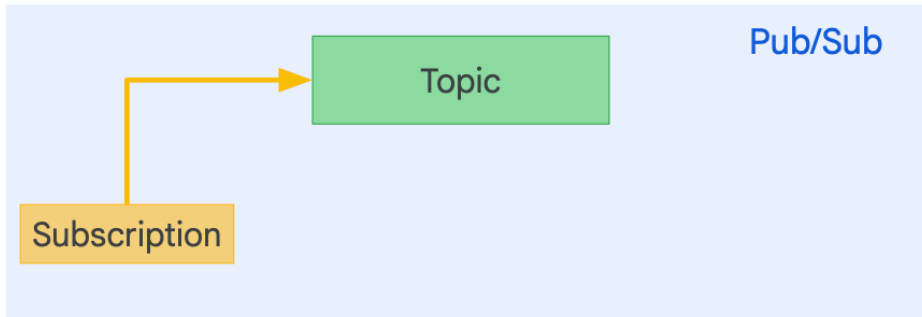
Pub/Sub



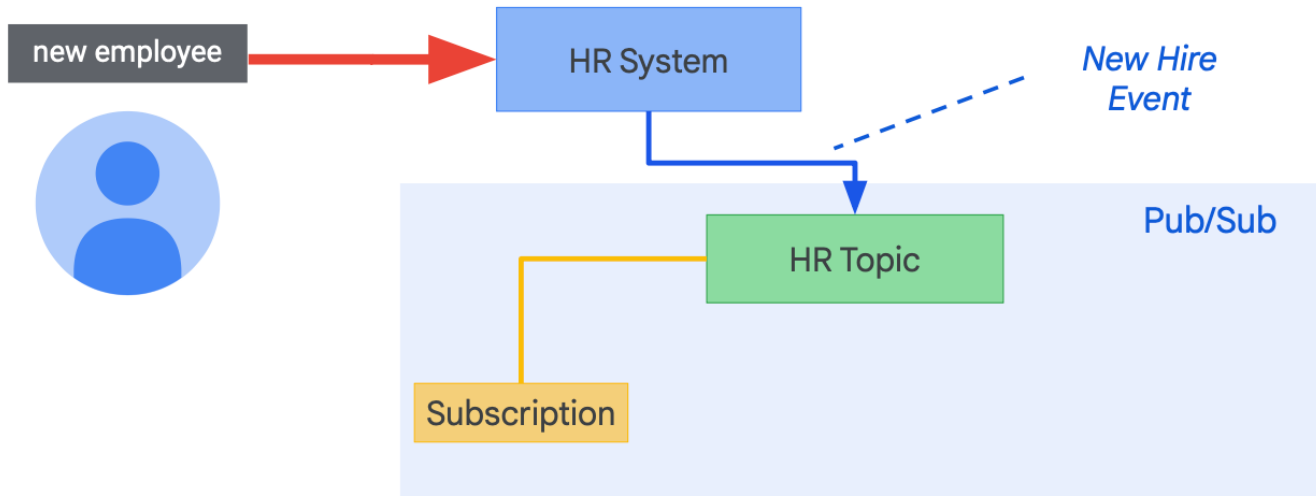
Qualities that Pub/Sub contribute to data engineering solutions:

- Availability
- Durability
- Scalability

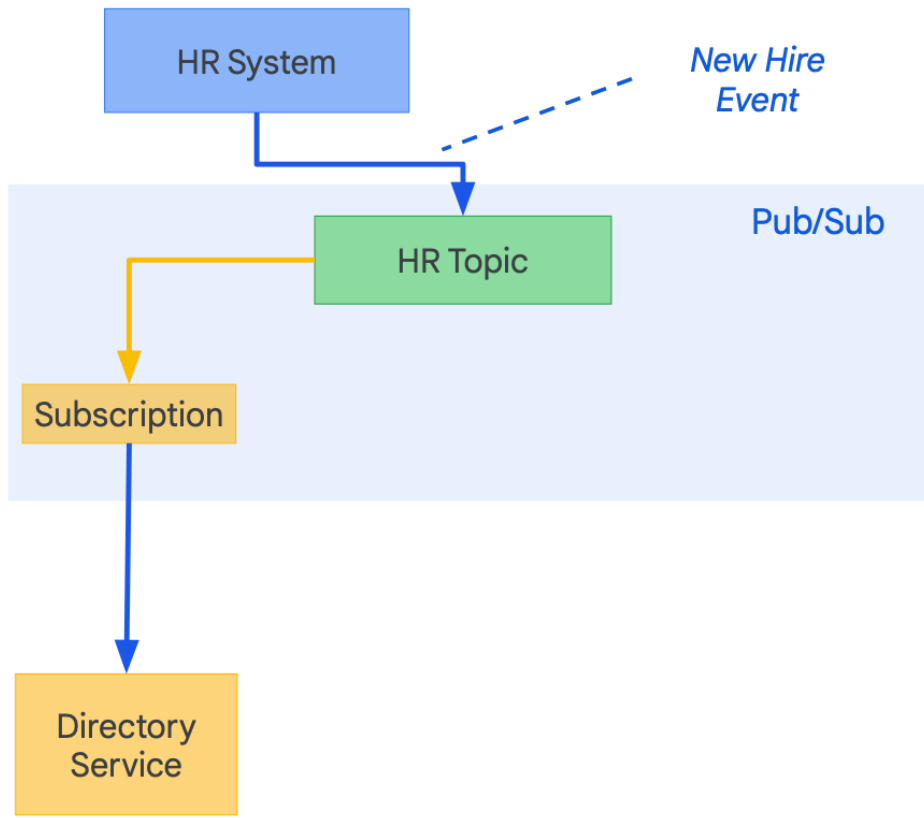
Example of a Pub/Sub application



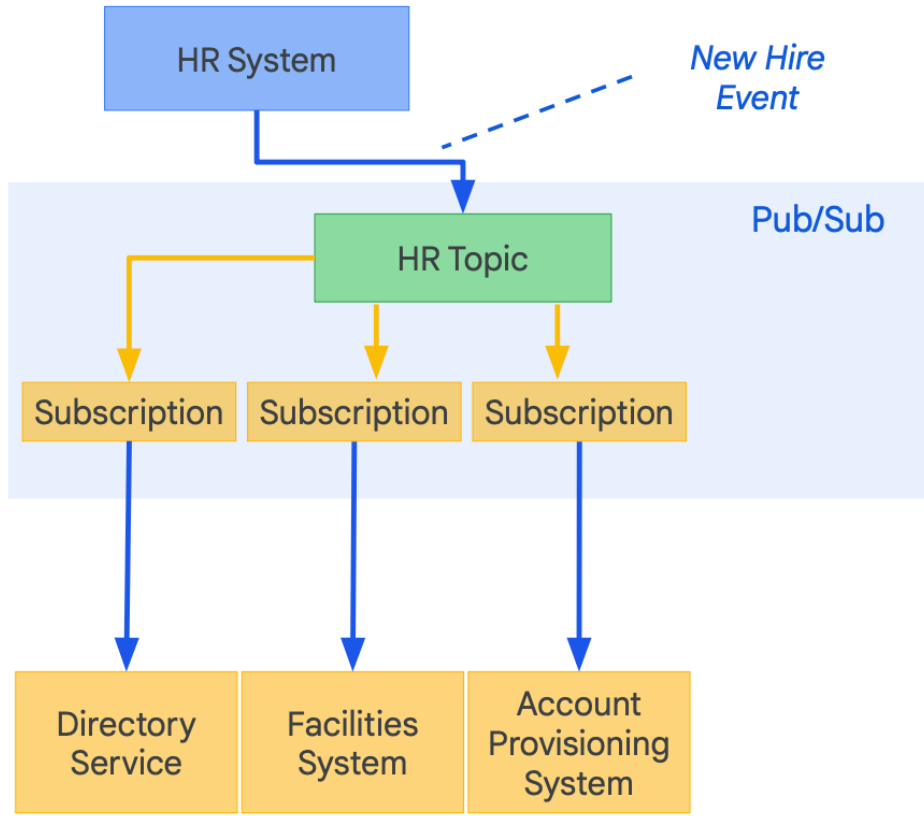
A new employee arrives causing a new hire event



The message is sent from Topic to Subscription

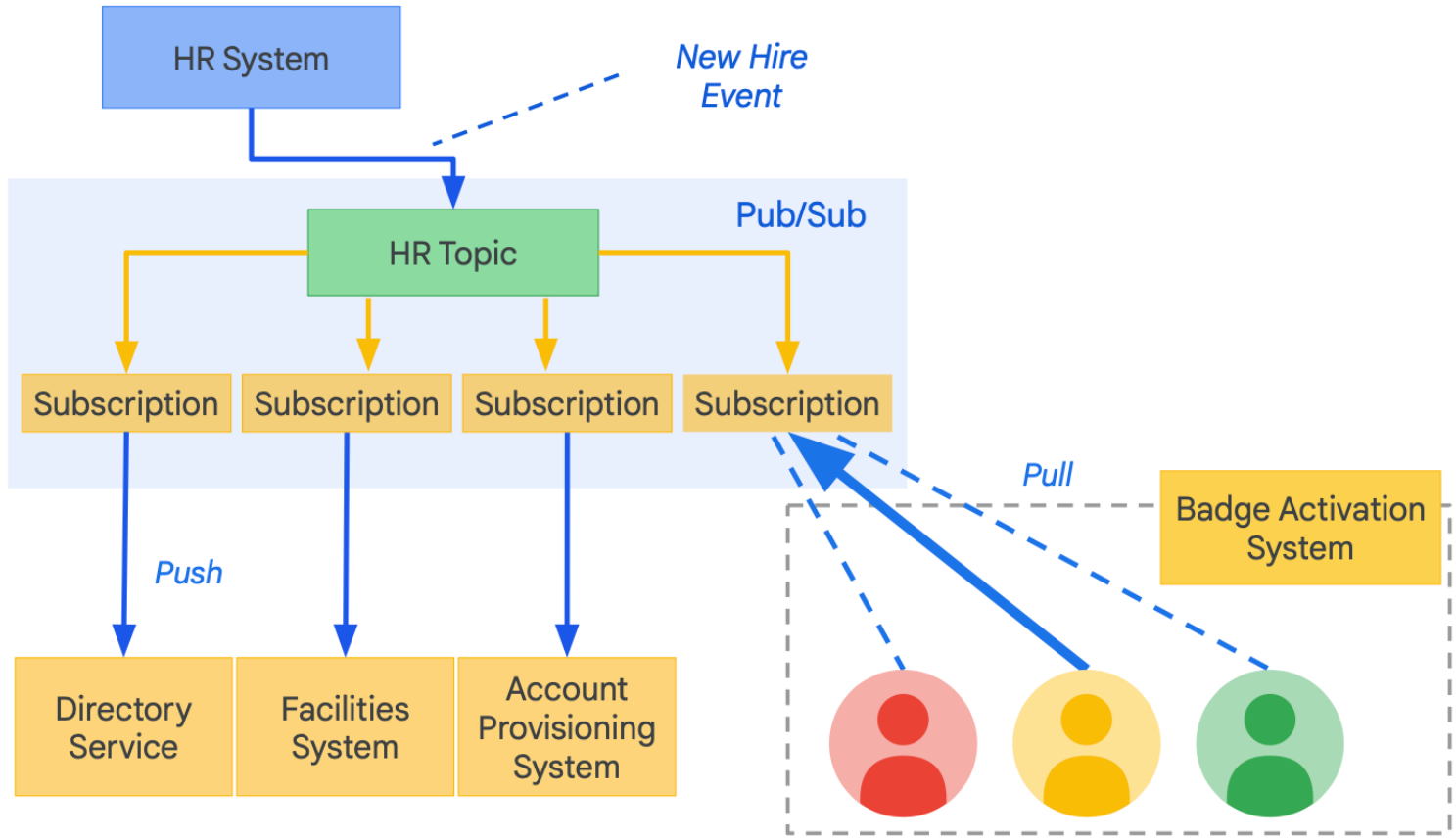


There can be multiple Subscriptions for each Topic

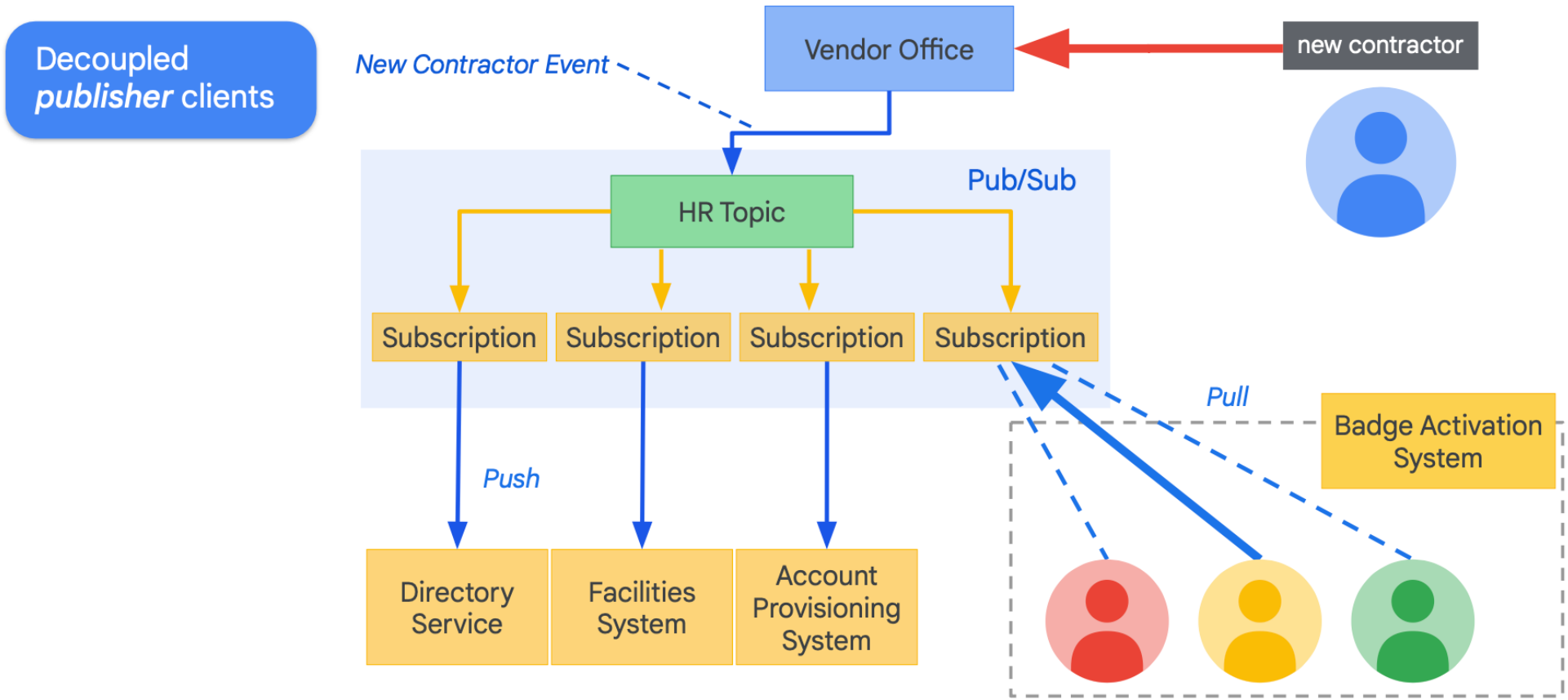


Decoupled ***subscriber*** clients

And there can be multiple subscribers per Subscription

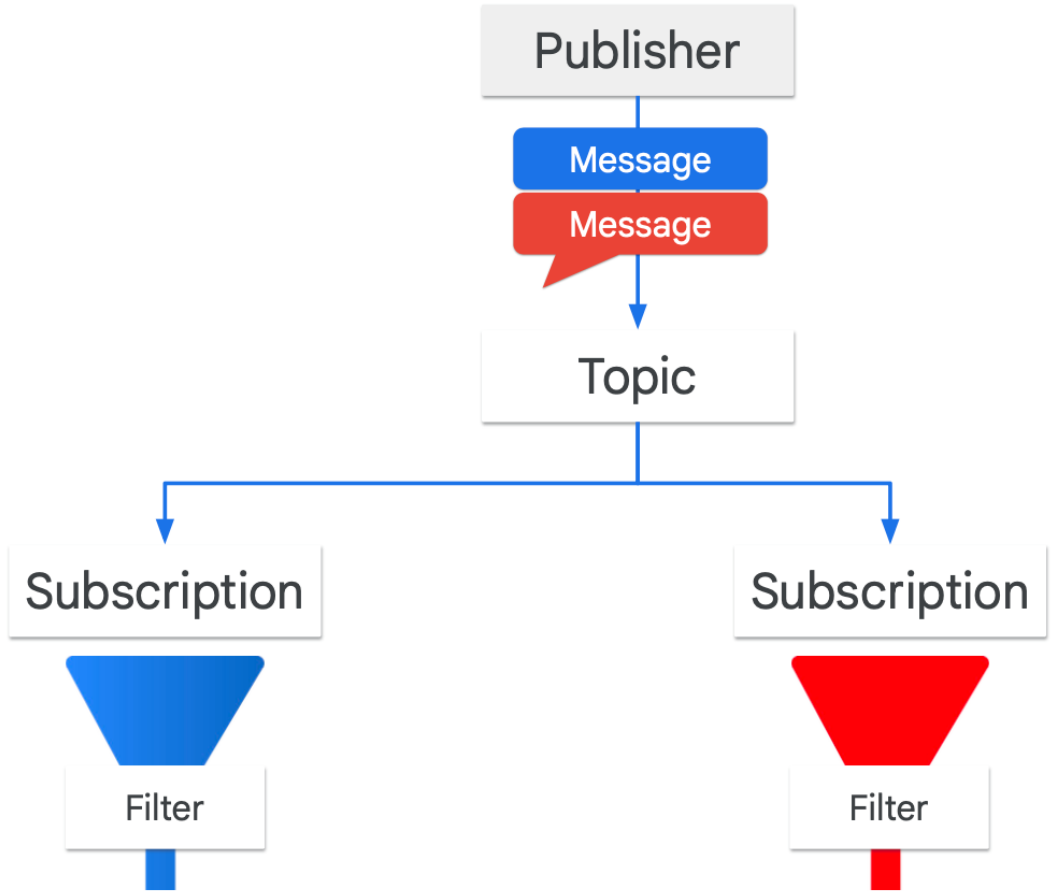


And there can be multiple publishers to the Topic



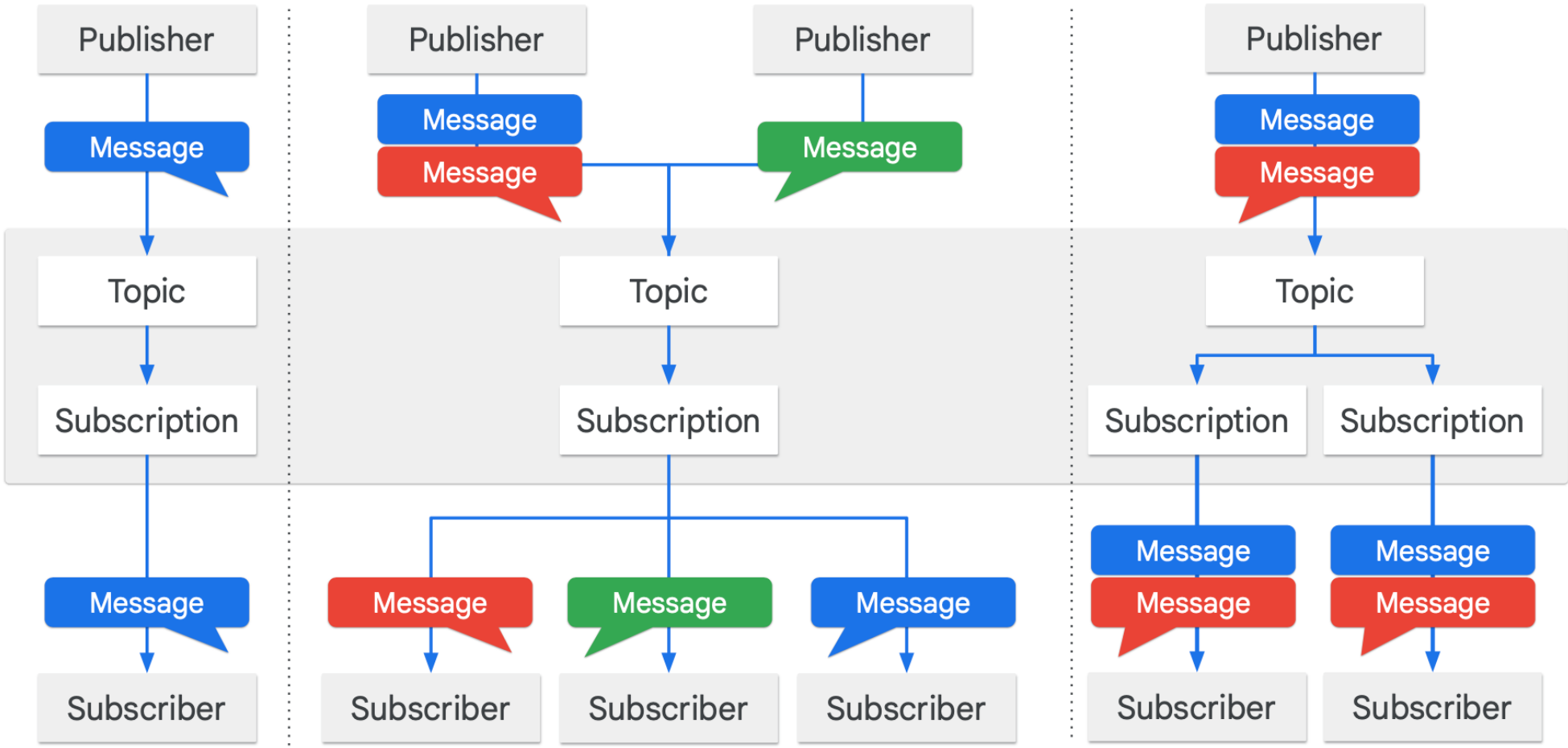
You can filter messages by their attributes

- Filter the Pub/Sub events on the message attributes.
- Configure via the Cloud Console, the `gcloud` command-line tool, or the Pub/Sub API.

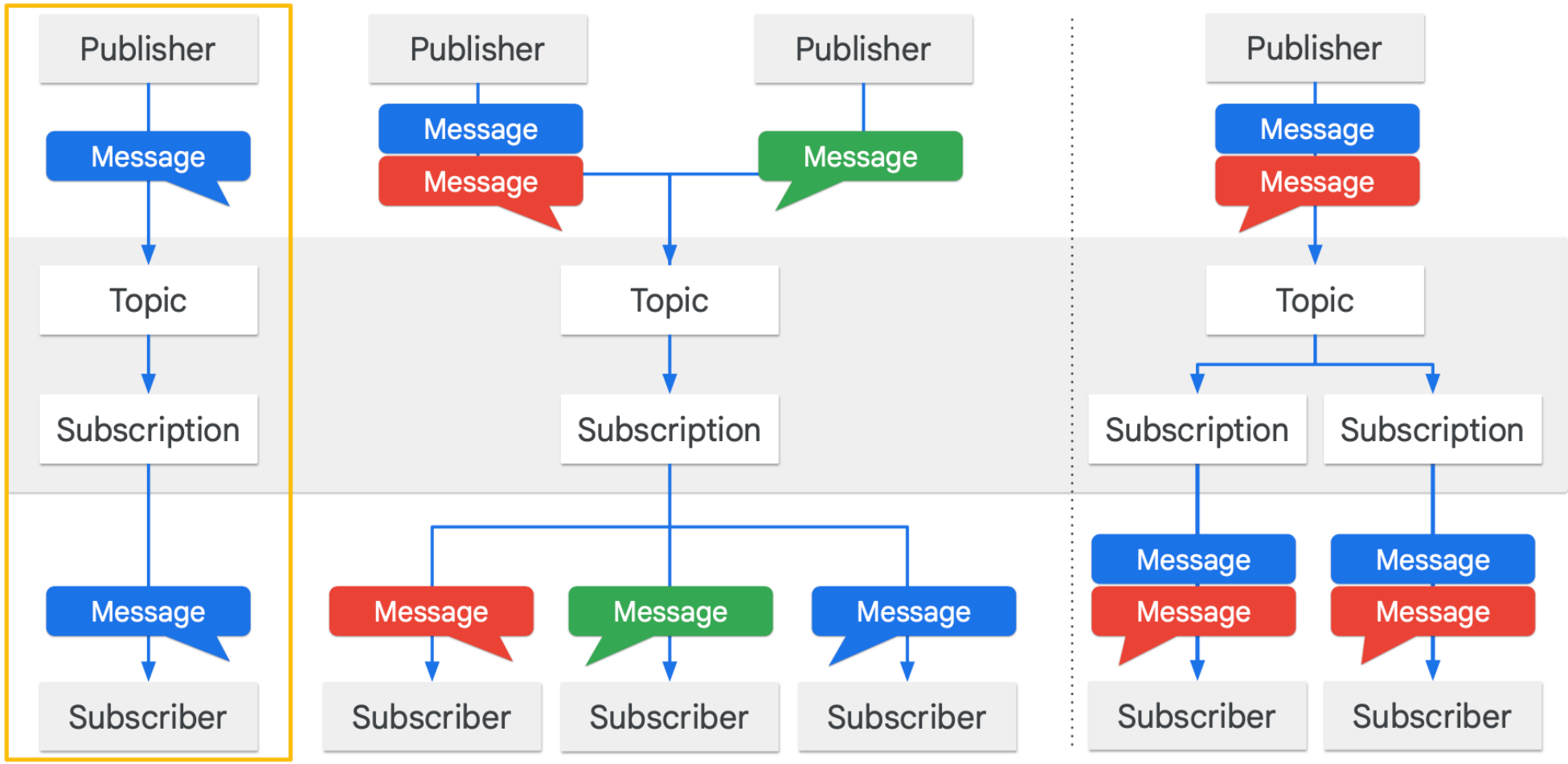


Pub/Sub Push Versus Pull

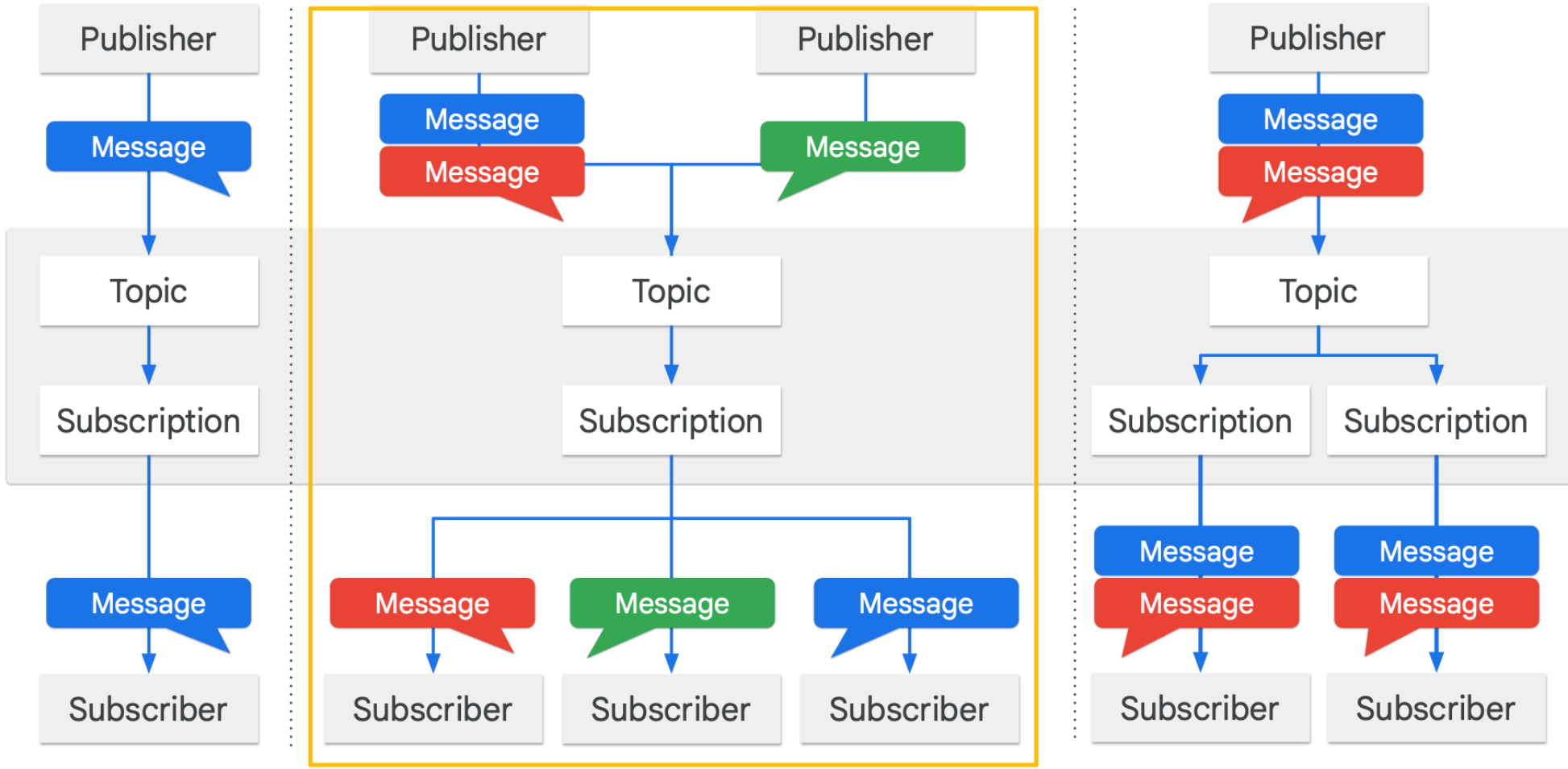
Publish/Subscribe patterns



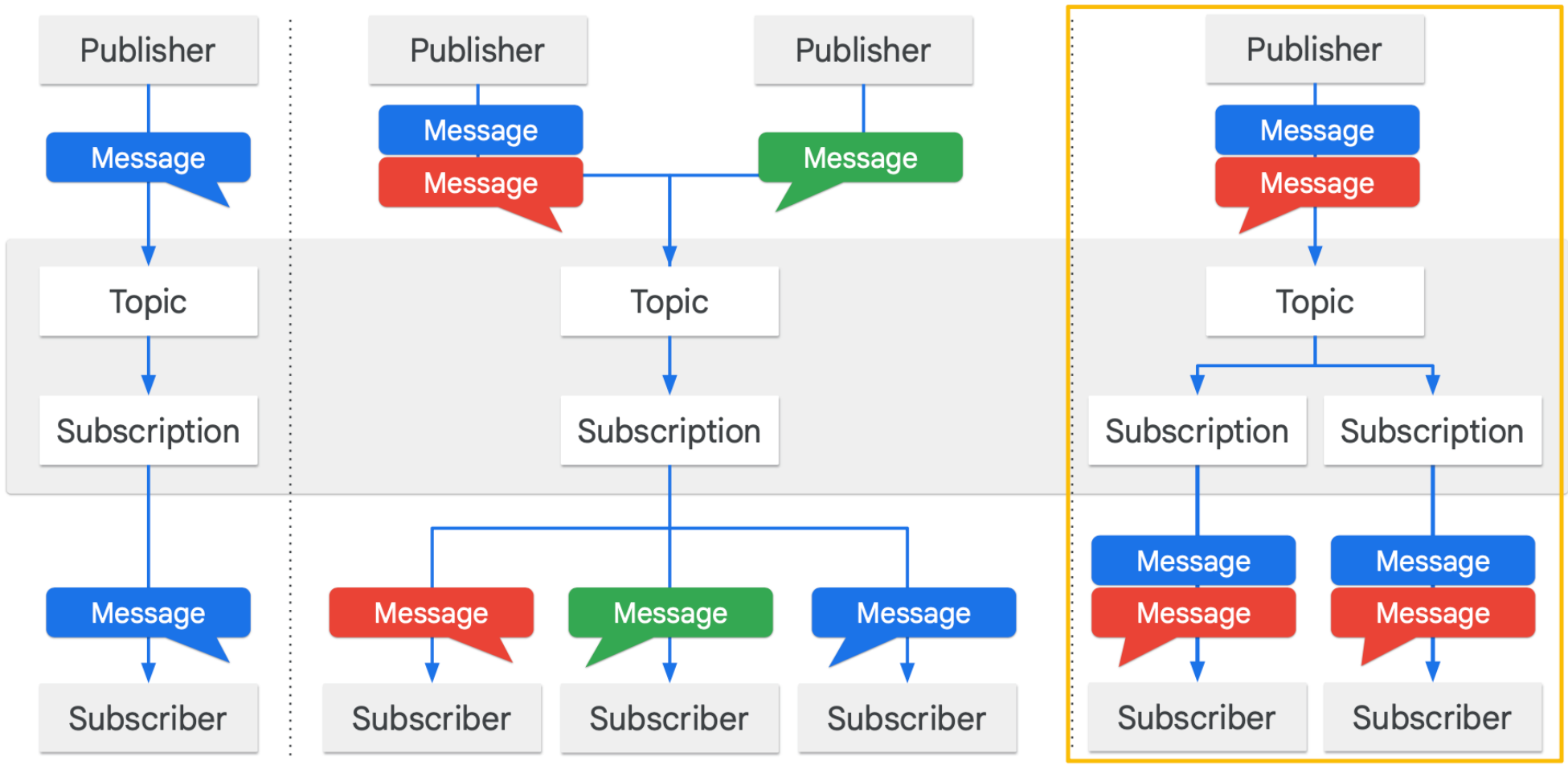
Publish/Subscribe patterns



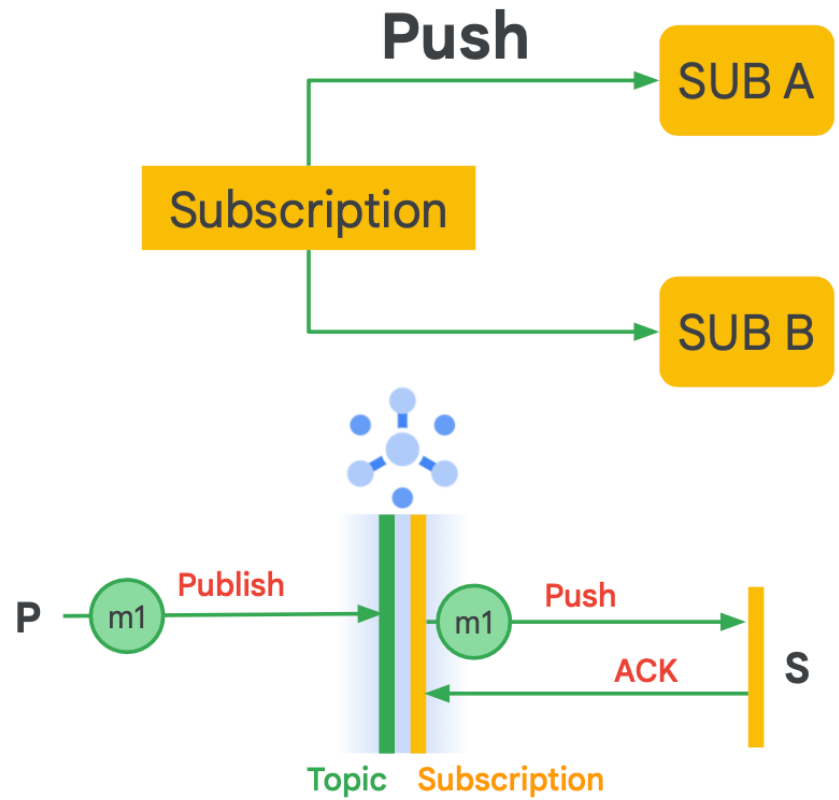
Publish/Subscribe patterns



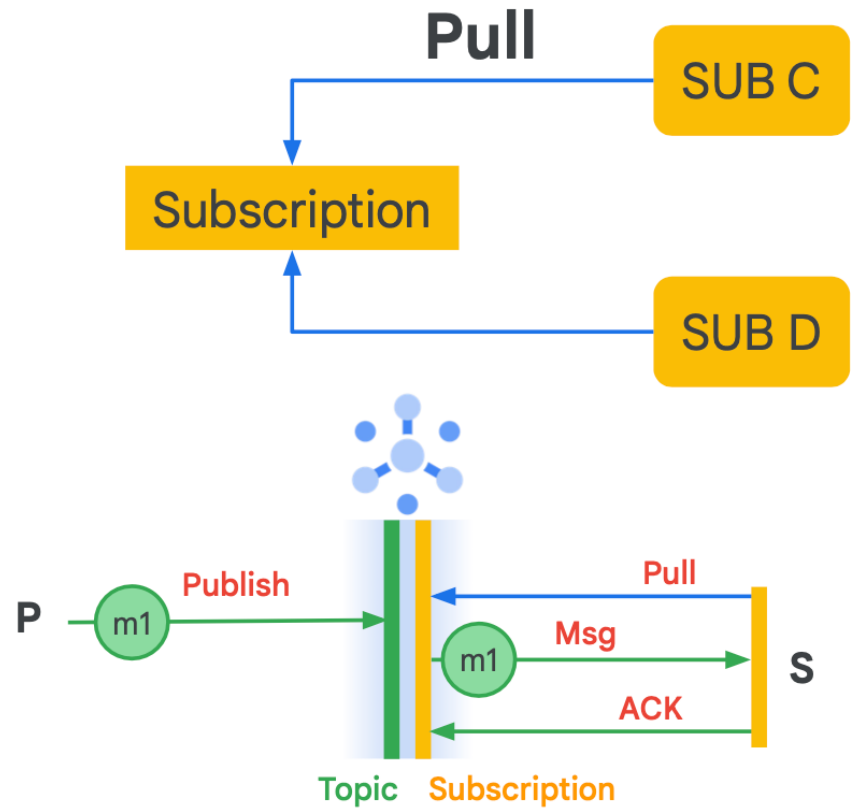
Publish/Subscribe patterns



Pub/Sub provides both Push and Pull delivery



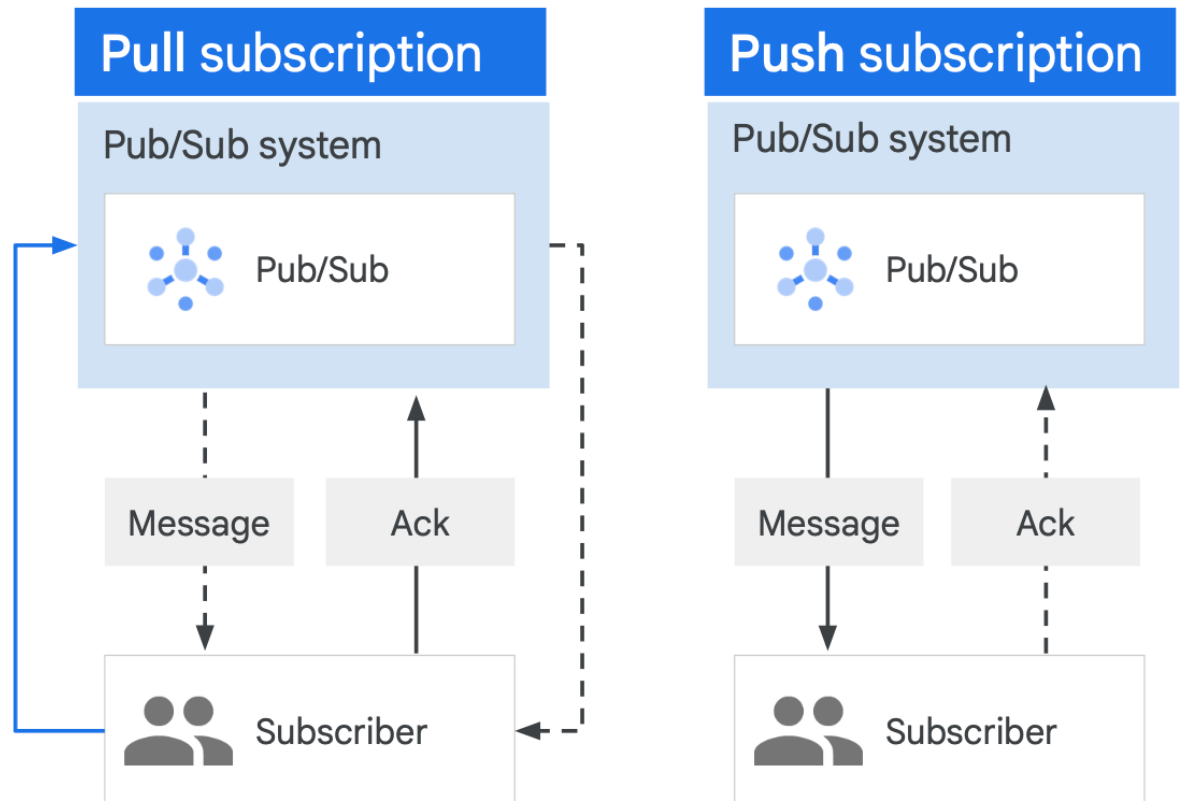
Acknowledgement used for dynamic rate control



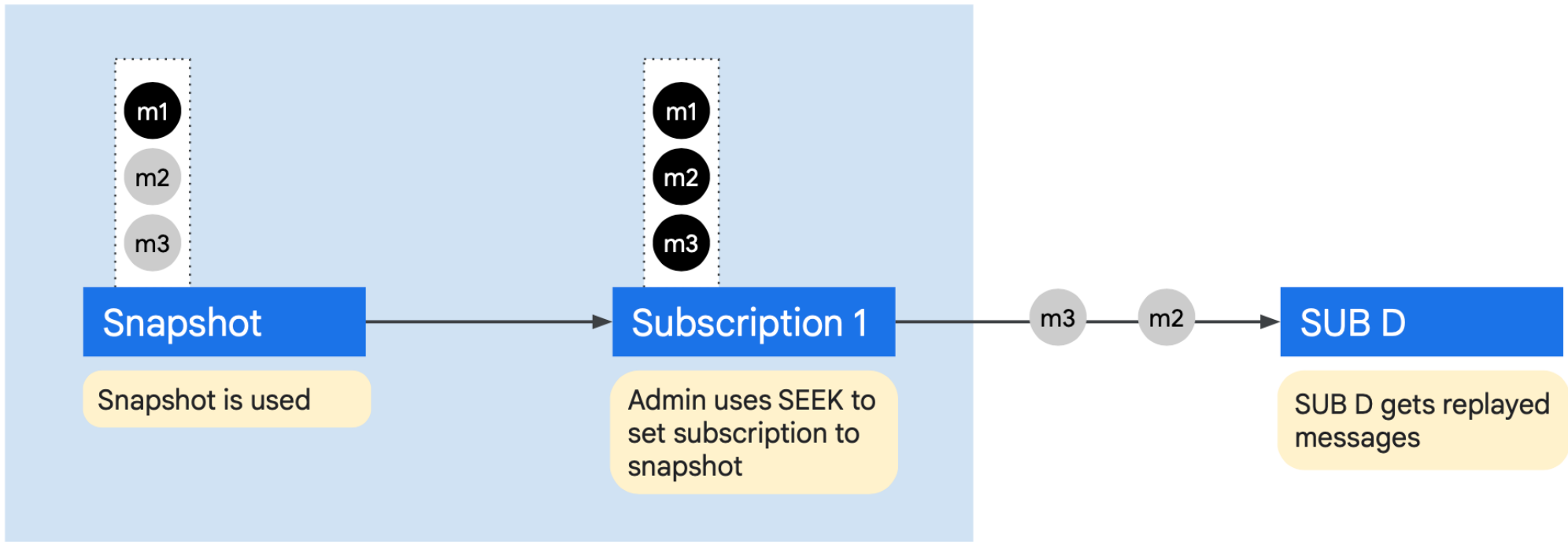
Messages are stored up to 7 days

At least once delivery guarantee

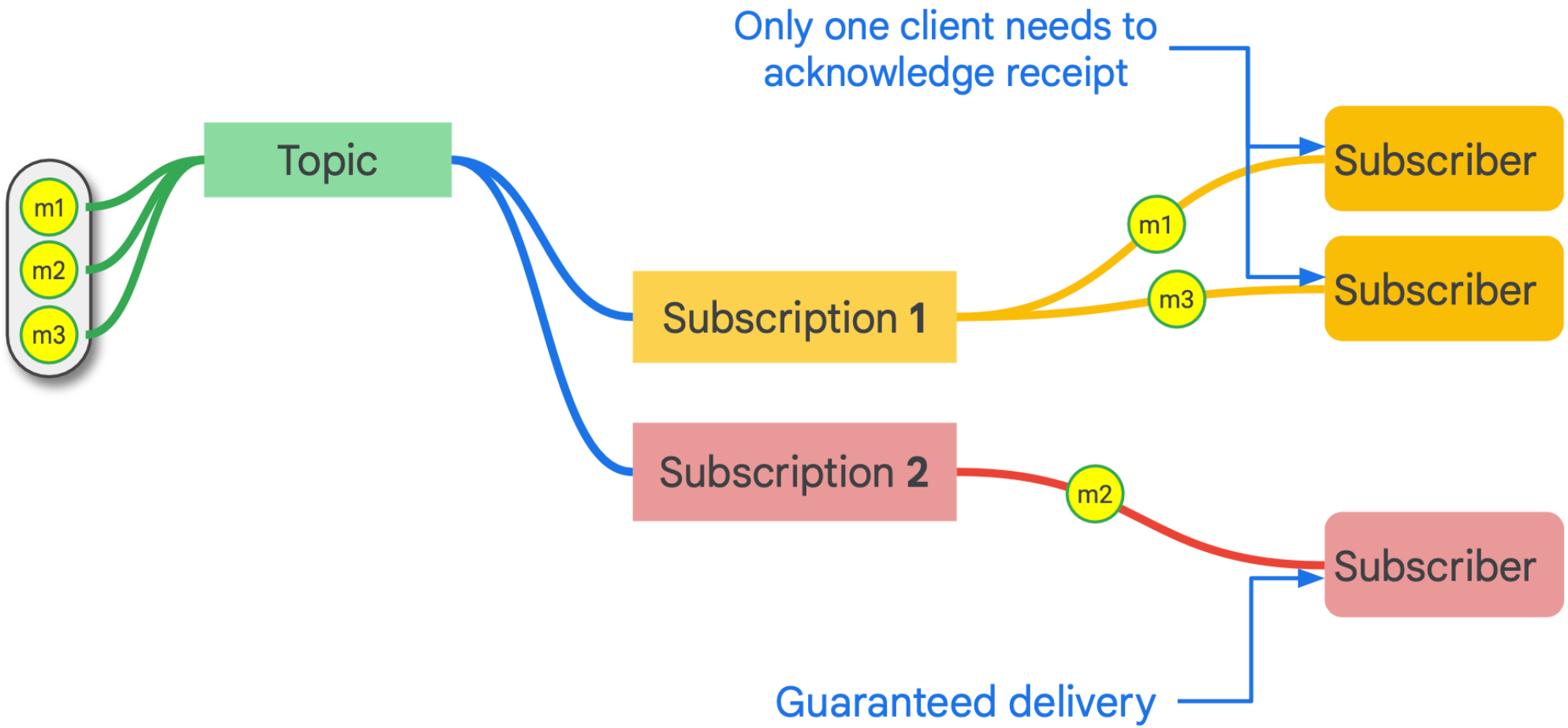
- A subscriber ACKs each message for every subscription
- A message is resent if subscriber takes more than `ackDeadline` to respond
- Messages are stored for up to 7 days
- A subscriber can extend the deadline per message



Message replay



Subscribers can work as a team or separately



Publishing with Pub/Sub Code

Publishing with Pub/Sub

```
gcloud pubsub topics create sandiego
```

Create topic

```
gcloud pubsub topics publish sandiego --message "hello"
```

Publish to topic

Python

```
import os
from google.cloud import pubsub_v1

publisher = pubsub_v1.PublisherClient()

topic_name = 'projects/{project_id}/topics/{topic}'.format(
    project_id=os.getenv('GOOGLE_CLOUD_PROJECT'),
    topic='MY_TOPIC_NAME',
)

publisher.create_topic(topic_name)
publisher.publish(topic_name, b'My first message!', author='dylan')
```

Create a client

Set topic name

Message

Send attribute

Subscribing with Pub/Sub using async pull

Python

```
import os
from google.cloud import pubsub_v1

subscriber = pubsub_v1.SubscriberClient()
topic_name = 'projects/{project_id}/topics/{topic}'.format(
    project_id=os.getenv('GOOGLE_CLOUD_PROJECT'),
    topic='MY_TOPIC_NAME'
)
subscription_name = 'projects/{project_id}/subscriptions/{sub}'.format(
    project_id=os.getenv('GOOGLE_CLOUD_PROJECT'),
    sub='MY_SUBSCRIPTION_NAME'
)
subscriber.create_subscription(
    name=subscription_name, topic=topic_name)

def callback(message):
    print(message.data)
    message.ack()

future = subscriber.subscribe(subscription_name, callback)
```

Select topic name

Set subscription name

Callback when message received

Create a client

Pull method
Callback function

Subscribing with Pub/Sub using synchronous pull

```
gcloud pubsub subscriptions create --topic sandiego mySub1
```

Create subscription

```
gcloud pubsub subscriptions pull --auto-ack mySub1
```

Pull subscription

```
import time

from google.cloud import pubsub_v1

subscriber = pubsub_v1.SubscriberClient()

subscription_path = subscriber.subscription_path(project_id, subscription_name)

NUM_MESSAGES = 2
ACK_DEADLINE = 30
SLEEP_TIME = 10

# The subscriber pulls a specific number of messages.
response = subscriber.pull(subscription_path, max_messages=NUM_MESSAGES)
```

Set subscription name

Create a client

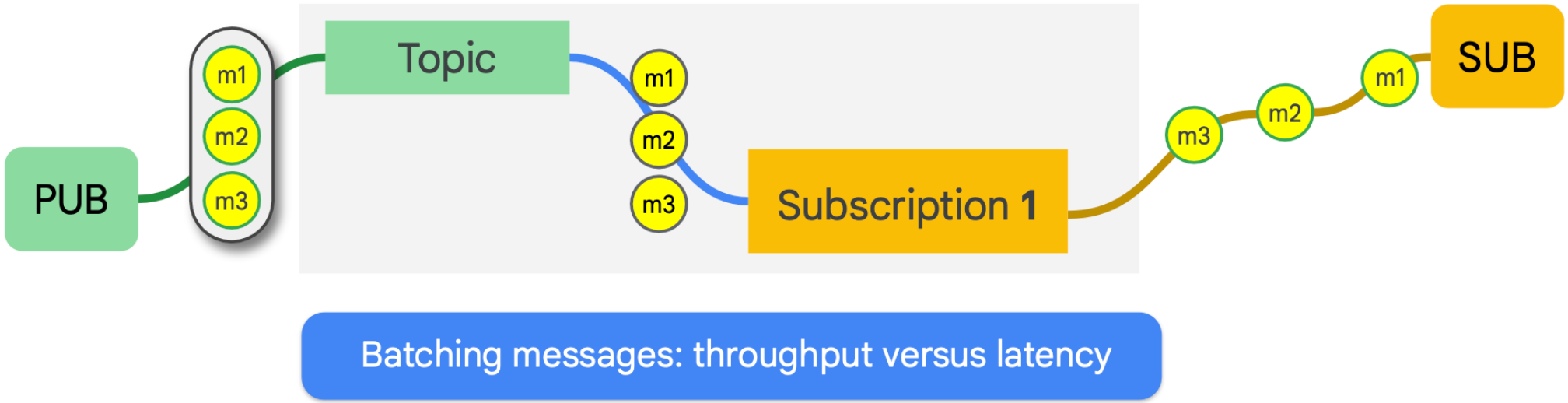
`projects/{project_id}/subscriptions/{subscription_name}`

subscription_path format

Subscriber is non-blocking

Keep the main thread from exiting to allow it to process messages synchronously

By default, the Pub/Sub publishing engine batches messages; turn this off if you desire lower latency



Changing the batch settings in Pub/Sub

Python

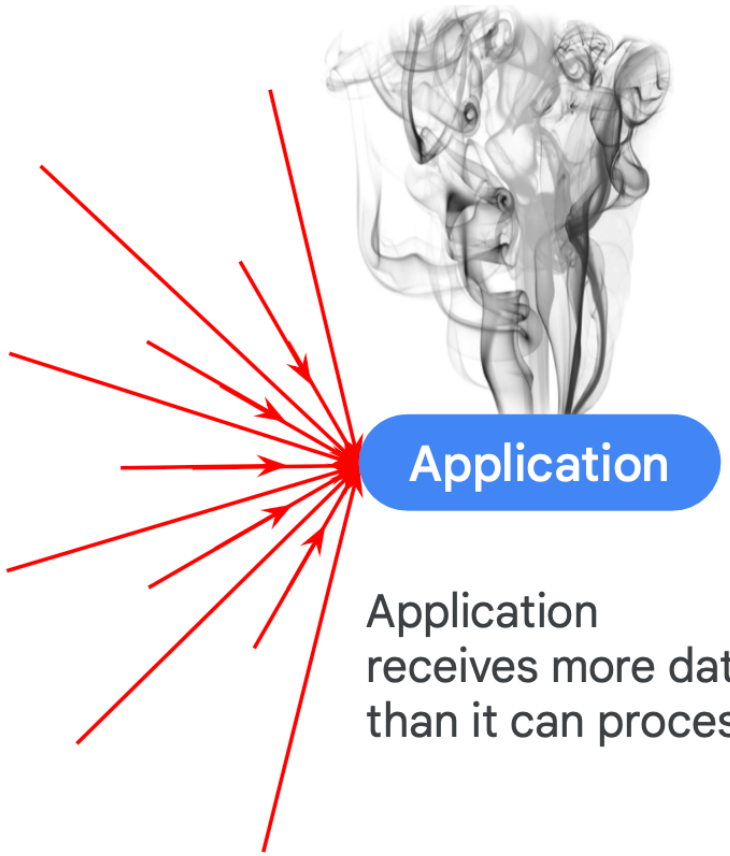
```
from google.cloud import pubsub
from google.cloud.pubsub import types

client = pubsub.PublisherClient(
    batch_settings=BatchSettings(max_messages=500),
)
```

Change batch setting

Pub/Sub: Latency, out-of-order, duplication will happen

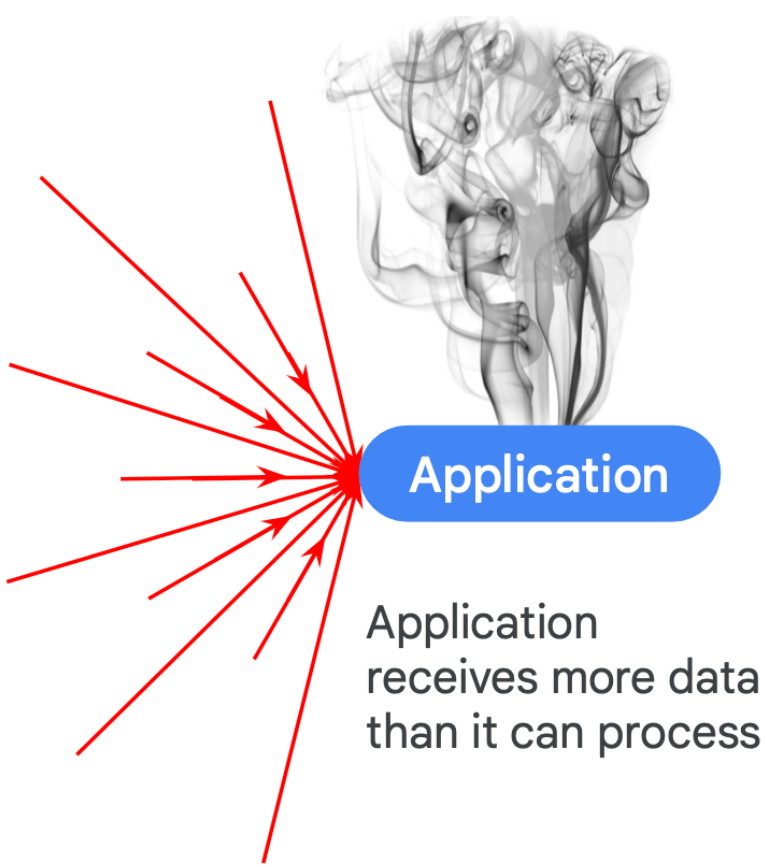
- If messages have the same ordering key and are in the same region, you can enable message ordering.
- To receive the messages in order, set the message ordering property on the subscription you receive messages from using the Cloud Console, the `gcloud` command-line tool, or the Pub/Sub API.
- Receiving messages in order might increase latency.

Use Pub/Sub for streaming resilience

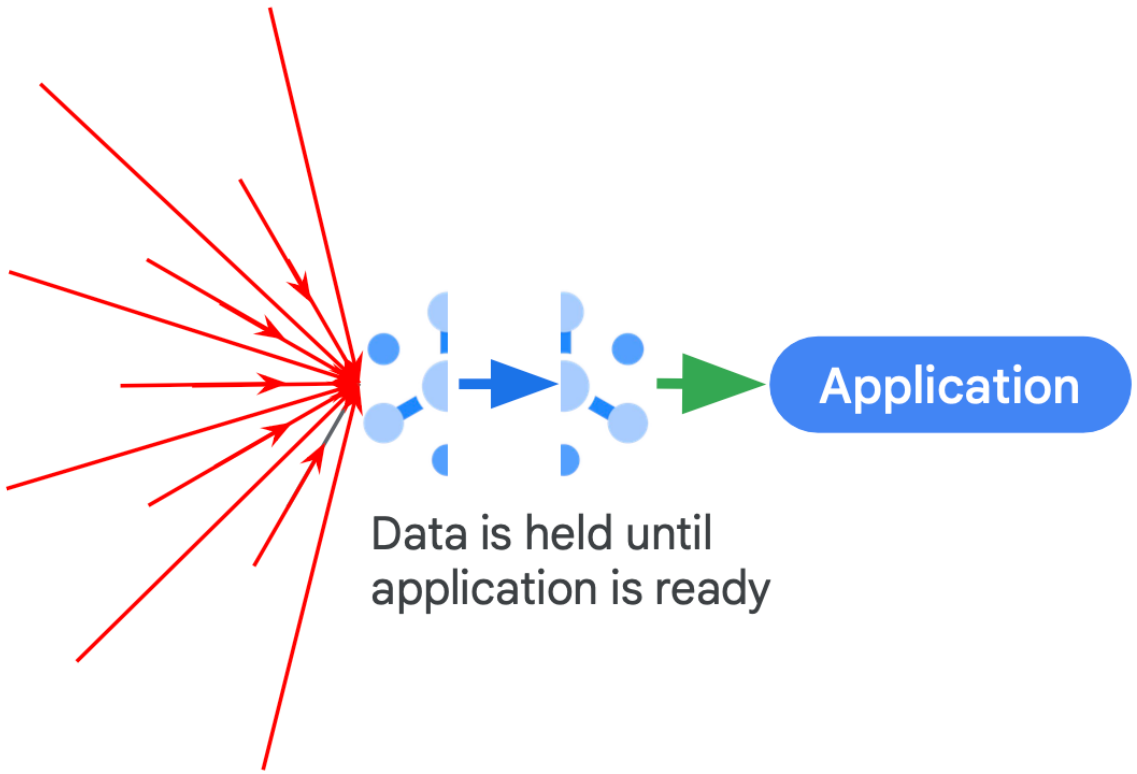


Application receives more data than it can process

Use Pub/Sub for streaming resilience

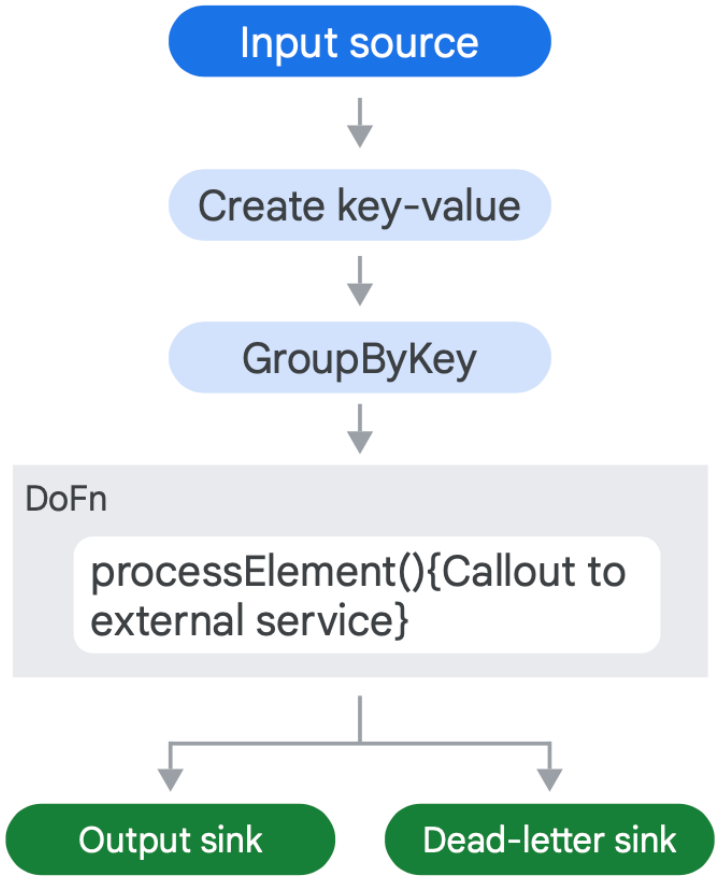


Application receives more data than it can process



Data is held until application is ready

Dead-letter sinks and error logging



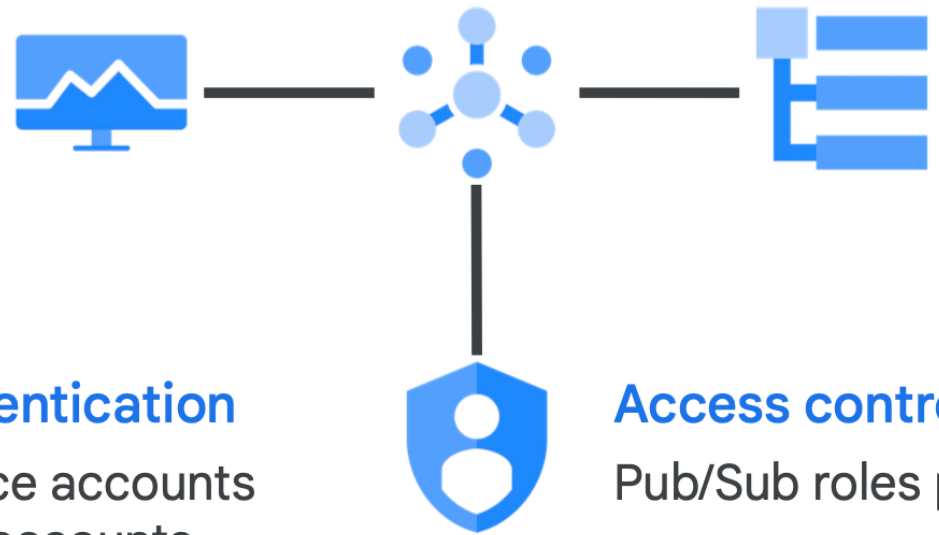
Exponential backoff

- Pub/Sub lets you configure an exponential backoff policy for better flow control.
- The idea behind exponential backoff is to add progressively longer delays between retry attempts.
- To create a new subscription with an exponential backoff retry policy, run the `gcloud pubsub create` command or use the Cloud console.

Security, monitoring, and logging for Pub/Sub

Cloud Logging metrics

pubsub_topic
pubsub_subscription



Cloud Audit Logs

Admin = on
Data Access = off

Authentication

Service accounts
User accounts

Access control

Pub/Sub roles per topic

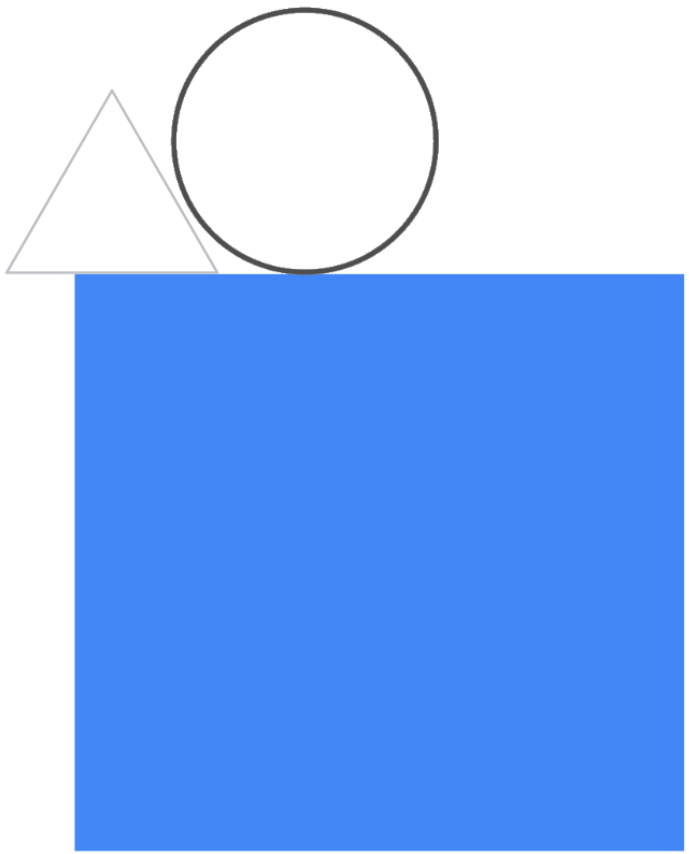
Summary

Latency, out-of-order, duplication will happen

Pub/Sub with Dataflow: Exactly once, ordered processing

Lab Intro

Streaming Data Processing:
Publish Streaming Data
into Pub/Sub



Lab objectives

01 Create a Pub/Sub topic and subscription

02 Simulate your traffic sensor data into Pub/Sub