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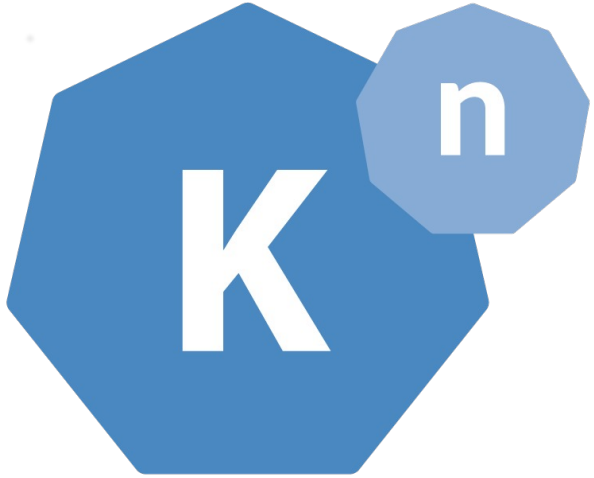
Knative Eventing



Bryan Zimmerman | Google

Nicolas Lopez | Google

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Agenda

- The Rise of MicroServices
- Event-driven Architecture
- Knative Eventing
- Demo: Image Processing
- Knative Community

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The Rise of Microservices

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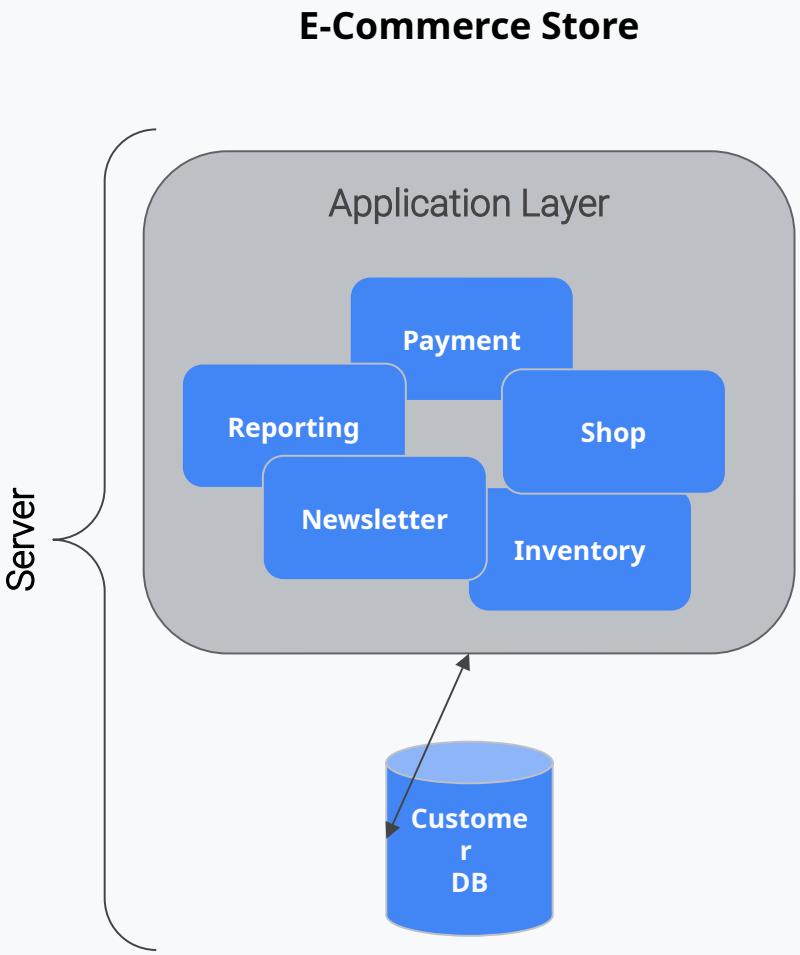

Monolith

- Scales Vertically not Horizontally.
- Overwhelming to build, deploy and maintain as teams and application grow.
- Nightmare to change something.

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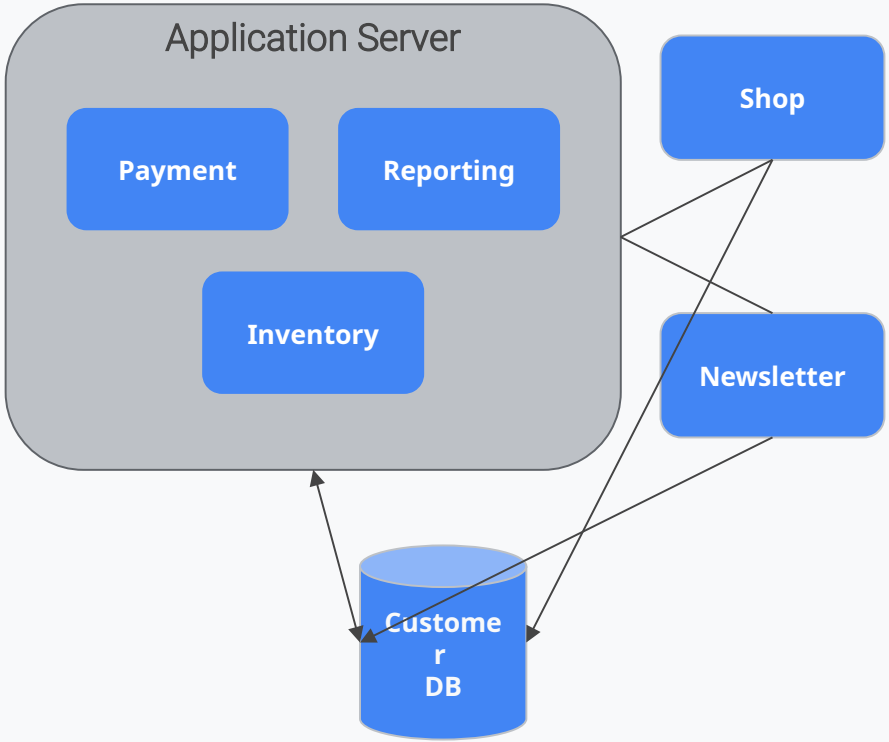
E-Commerce Store



- Monolith
- Microservices

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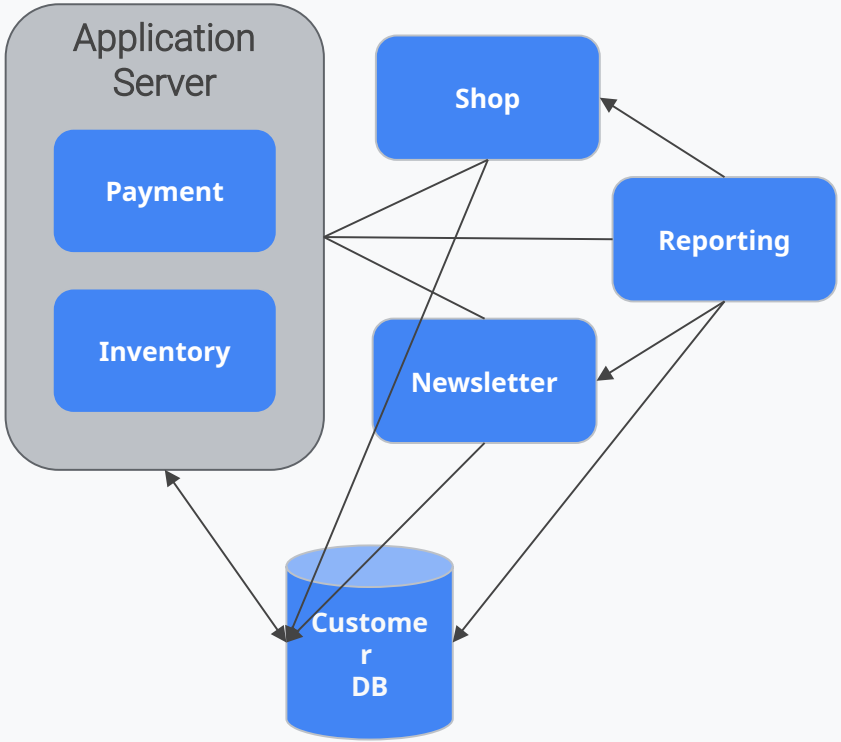
E-Commerce Store



- Monolith
- Microservices

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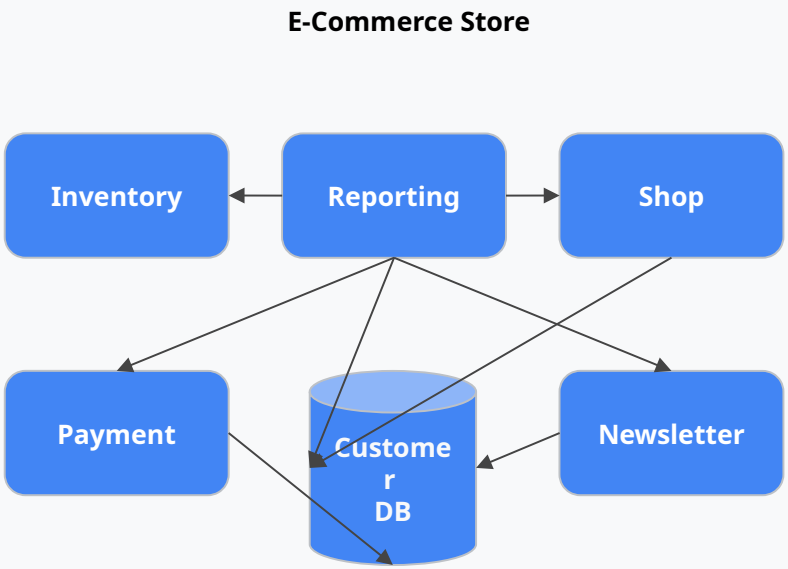

- Monolith
- Microservices
  - “Separation of concerns”
    - Promotes Agile development.
    - Easy to build, maintain, and deploy.
    - Flexibility to build in the language of your choice.
  - Services can be scaled independently to meet demand.

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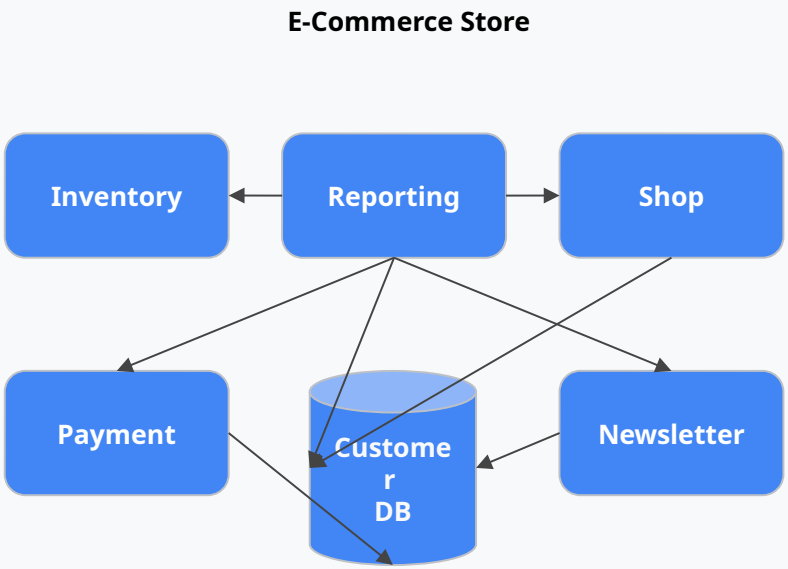

Monolith

Microservices

- Services can be scaled independently to meet demand.
- “Separation of concerns”
  - Promotes Agile development.
  - Easy to build, maintain, and deploy.
  - Flexibility to build in the language of your choice.
- Spider web of point-to-point integrations.
- Coupling with p2p inter-service communication.
- Adding/Removing services requires changing other services.

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Event-Driven Microservices

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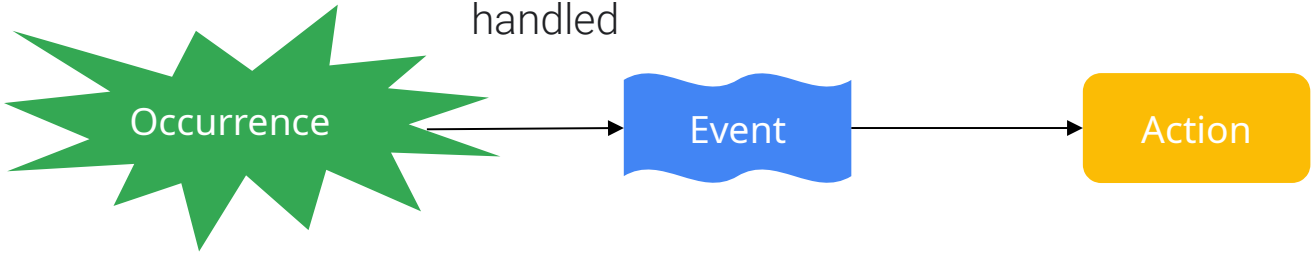
What is an Event?

- An **event** is a record expressing an occurrence and its context
- Events represent facts and therefore do not include a destination
- The producer has no expectation of how the event is handled



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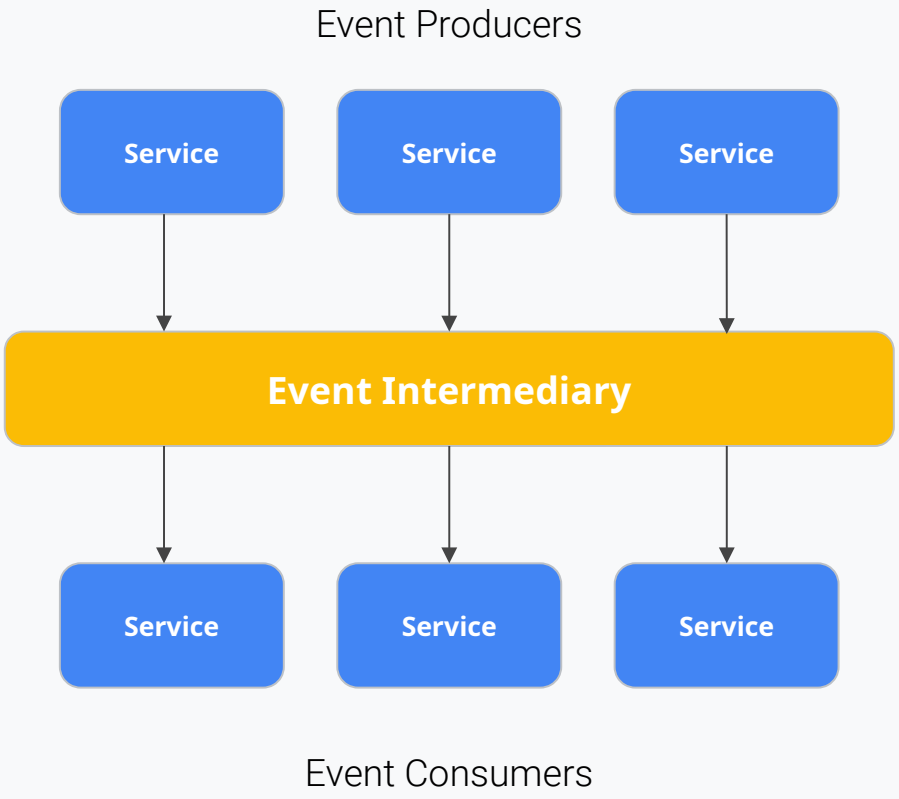

Event-driven Microservices

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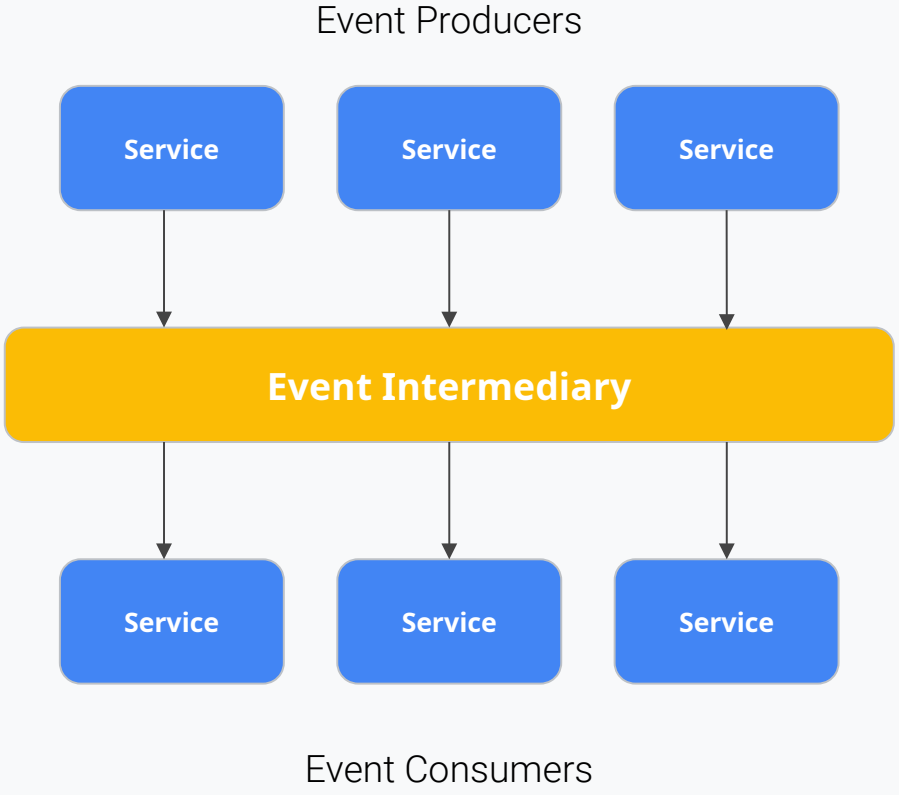

Event-driven Microservices

- Fully decoupled with no point-to-point communication.
- Highly Scalable.
- Extend organically - Add/Remove services without modifying existing application.

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Knative Eventing

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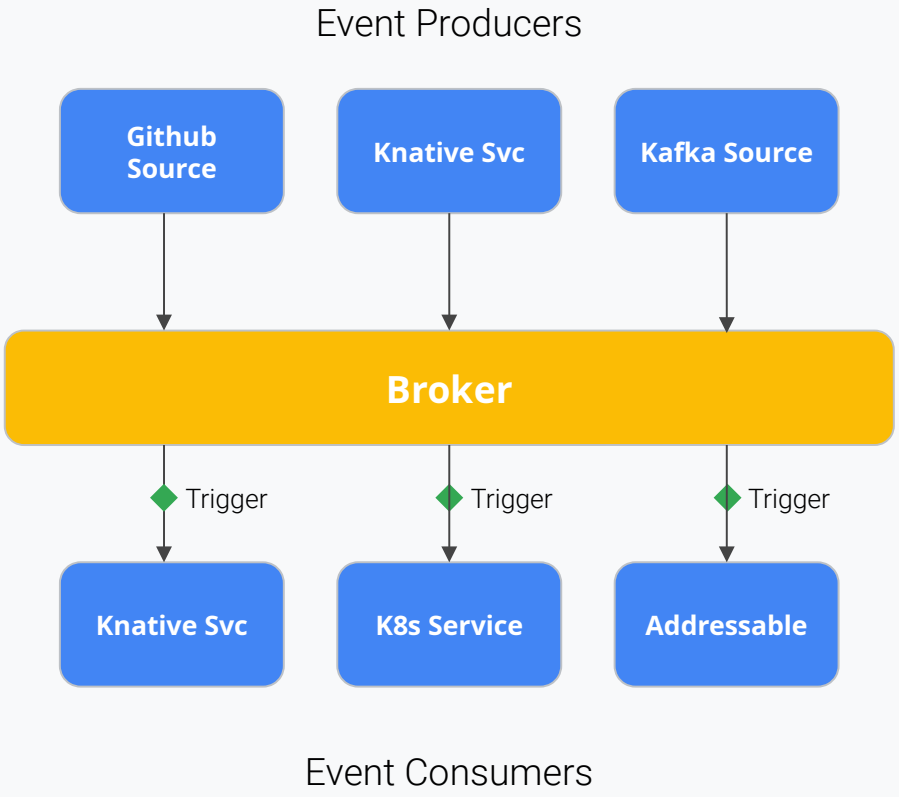

Knative Eventing

- Composable primitives to enable late-binding event producers and event consumers.
- Cloud Events to standardize event data
- Event Producers (Sources) produce Cloud Events
- Event Consumer is any Addressable such as Knative Service, K8s Service
- Broker and Trigger as intermediary
- Events and Source Registry for discovery.
- More primitives - Channels, Sequence, Parallel etc

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Knative Eventing in Action

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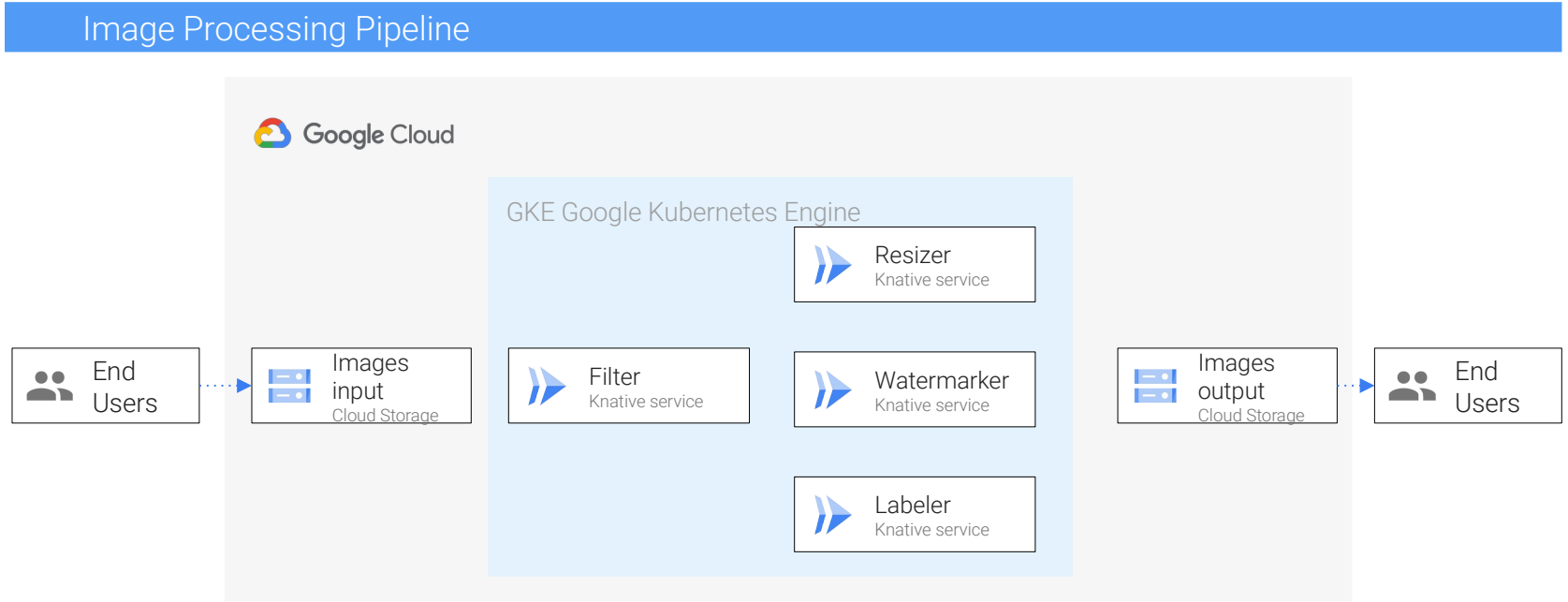
Image Processing Pipeline application



https://github.com/meteatamel/cloudrun-tutorial/blob/master/docs/image-processing-pipeline-gke.md

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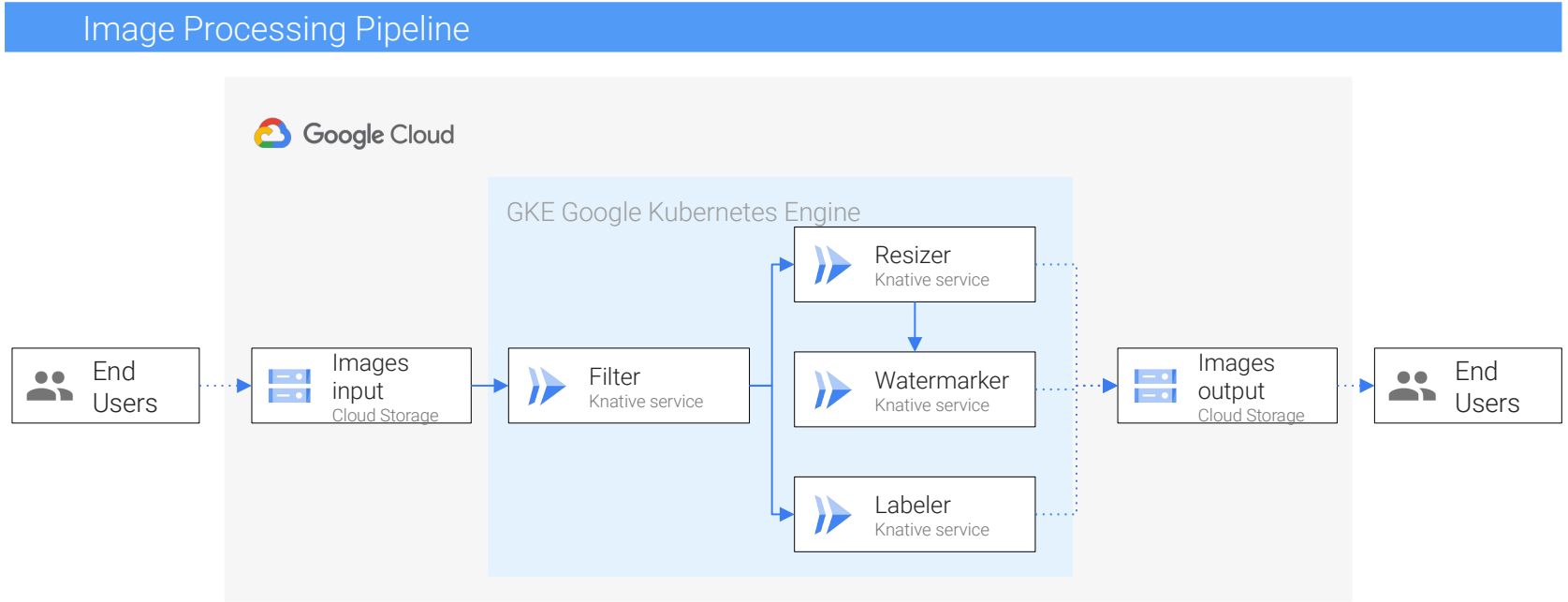
Image Processing Pipeline application

- We will setup **1 source** + **4 triggers** to connect the services via events



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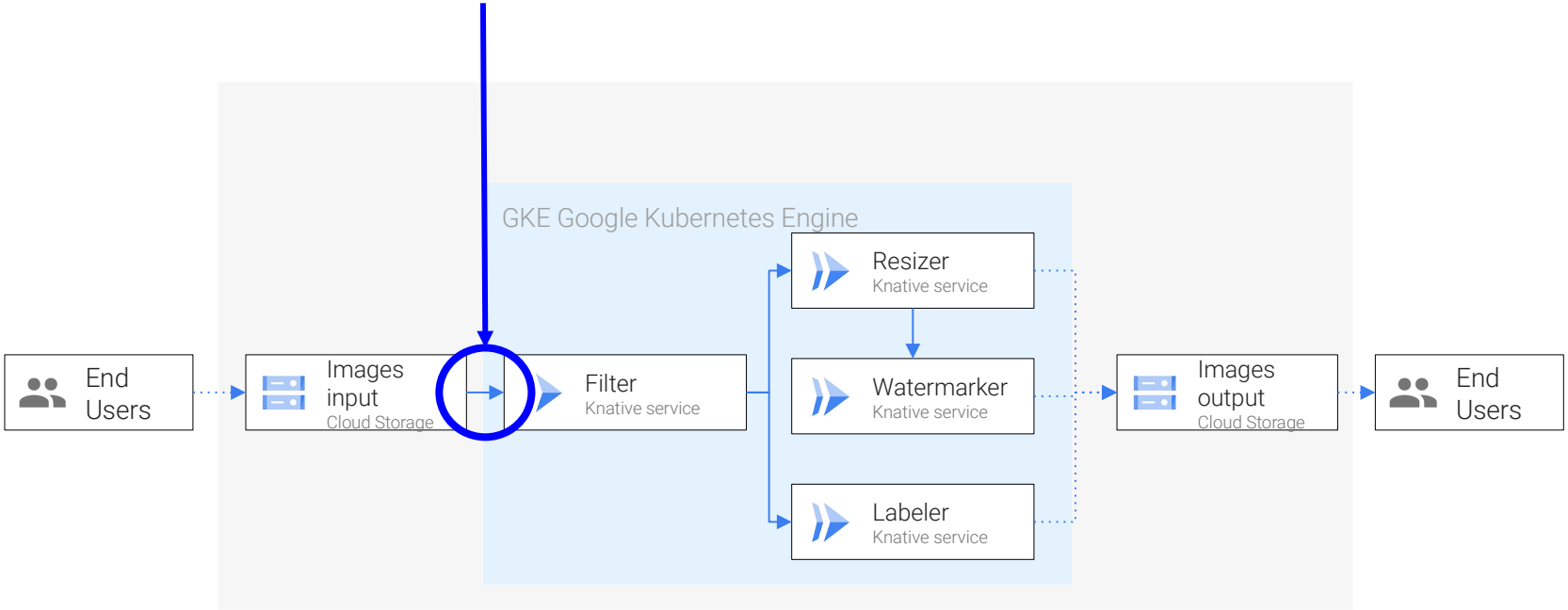
CloudStorageSource + trigger

- When an object gets stored in GCS, an event will be sent to the cluster



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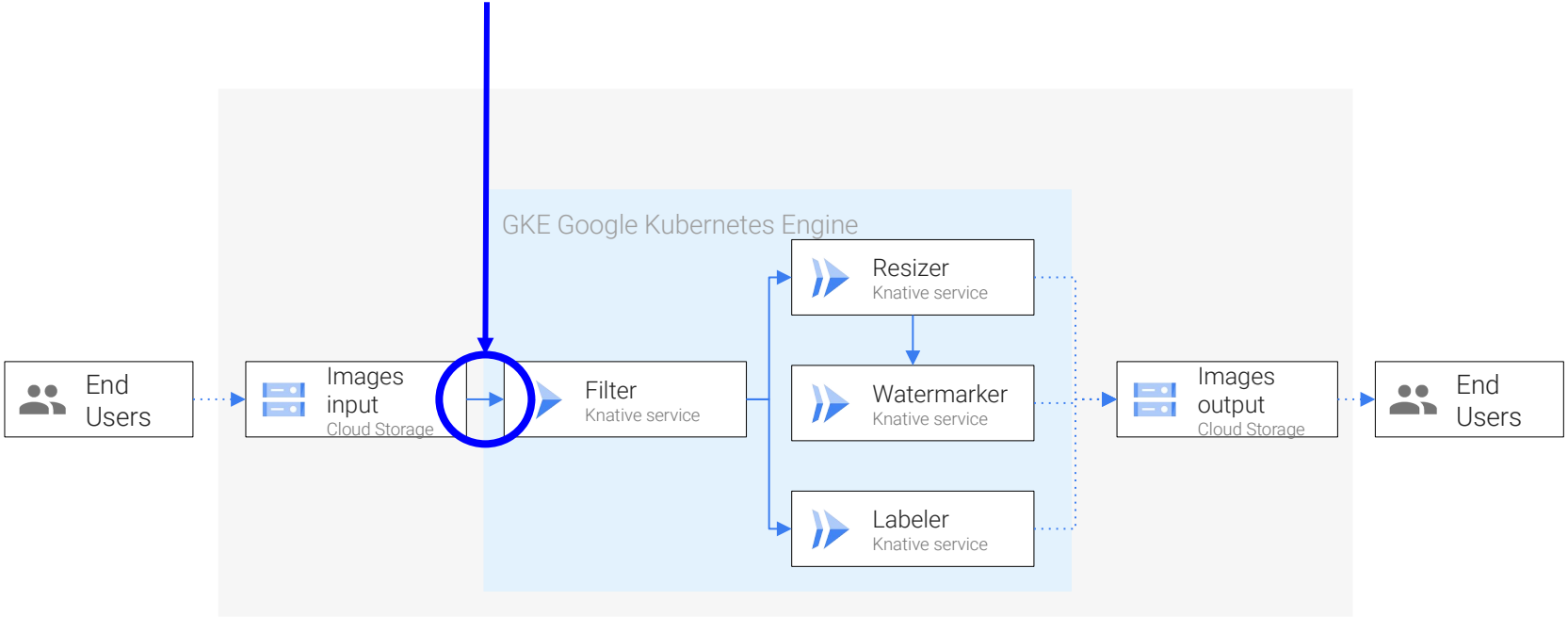
CloudStorageSource + trigger

- **Trigger** allows Storage Source events to be routed to the **Filter** service



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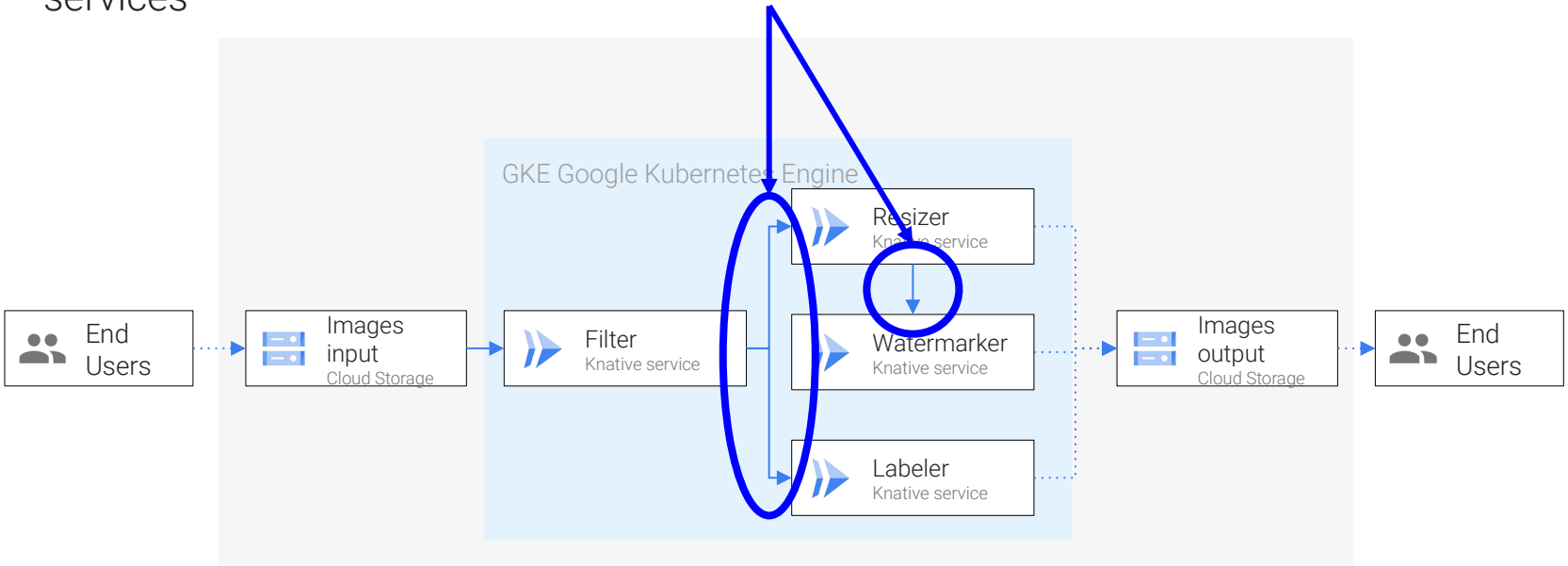
Custom Triggers

- Custom events are sent by the services with a **trigger** configurd to route the events to other services



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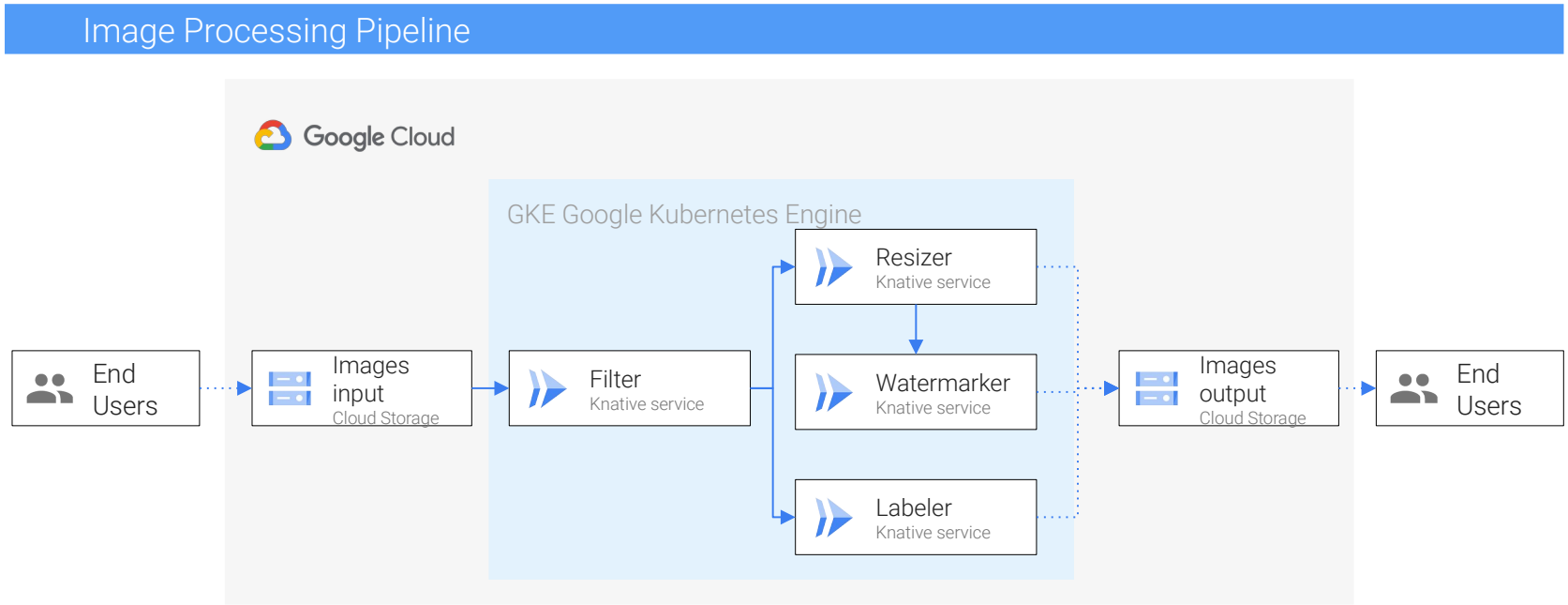
Ready!



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Knative Eventing Core Concepts

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Knative Eventing Source

- An event Source (https://knative.dev/docs/eventing/sources/) generates events or imports events from external producers
- Existing Sources
  - Community owned - Kafka, Github, etc.
  - Vendor owned
    - Google: CloudStorage, CloudAuditLog, etc.
    - TriggerMesh: AWS SQS, AWS Kinesis, etc.
  - Custom sources

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How are Knative Sources implemented?

- Use standard way of extending Kubernetes: Custom Resource Definitions (CRDs)
- CRDs define new resource types → Class in a programming language
- Instances of CRDs are called Custom Objects (COs) → Object in a programming language

https://kubernetes.io/docs/tasks/extend-kubernetes/custom-resources/custom-resource-definitions/

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Types of Knative Sources

- Push
  - Must be exposed to the sender
    - E.g. a publicly exposed URL for GitHub to make requests against
  - Easier to scale
  - Can use Knative Services, scaling down to zero

- Pull
  - Something must always be running
  - Needs network access to the producer, but does not need to expose an endpoint
  - Harder to scale

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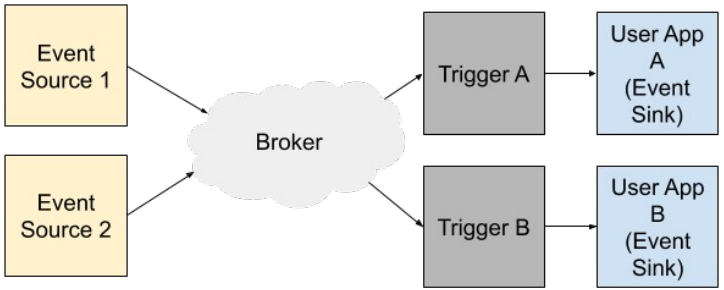
Broker & Trigger

- Broker (https://knative.dev/docs/eventing/broker/)
- Triggers (https://knative.dev/docs/eventing/triggers/) are the way to subscribe events from a specific Broker
  - Filtering based on CloudEvents attributes
  - Event sink could be any "addressable"
- Broker implementations
  - Default
  - Alternative Broker implementations, e.g. GCP, Kafka



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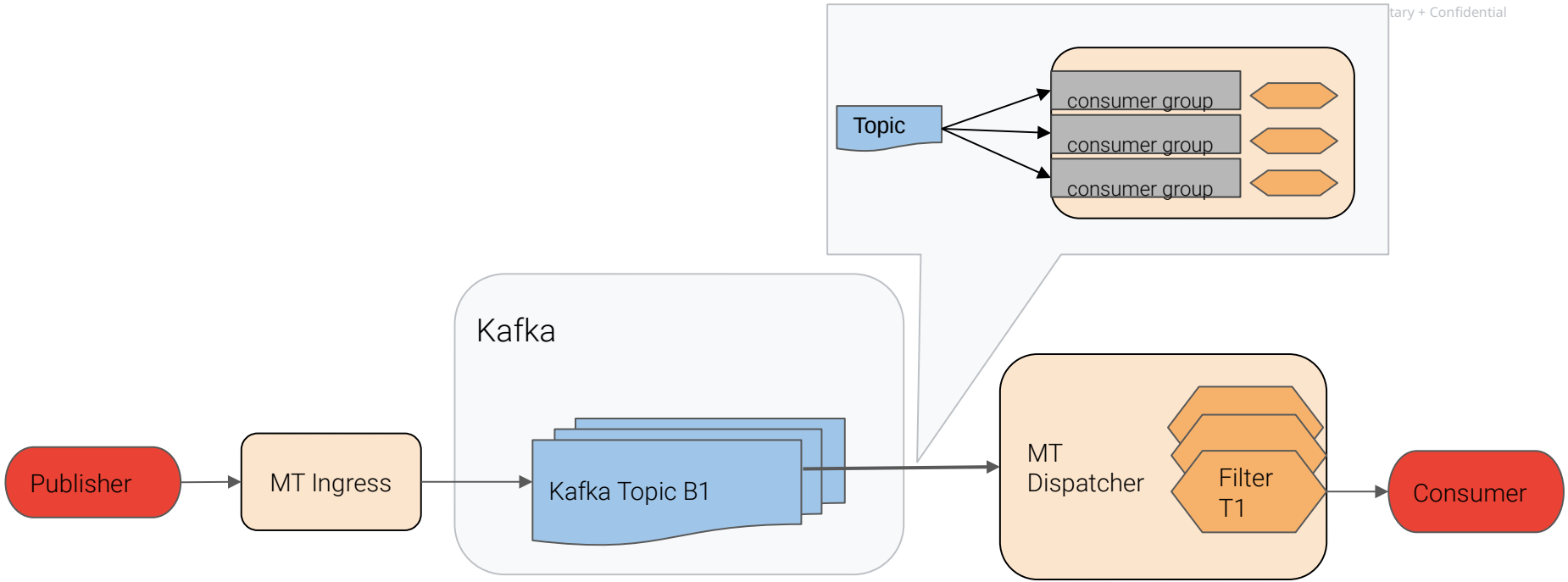

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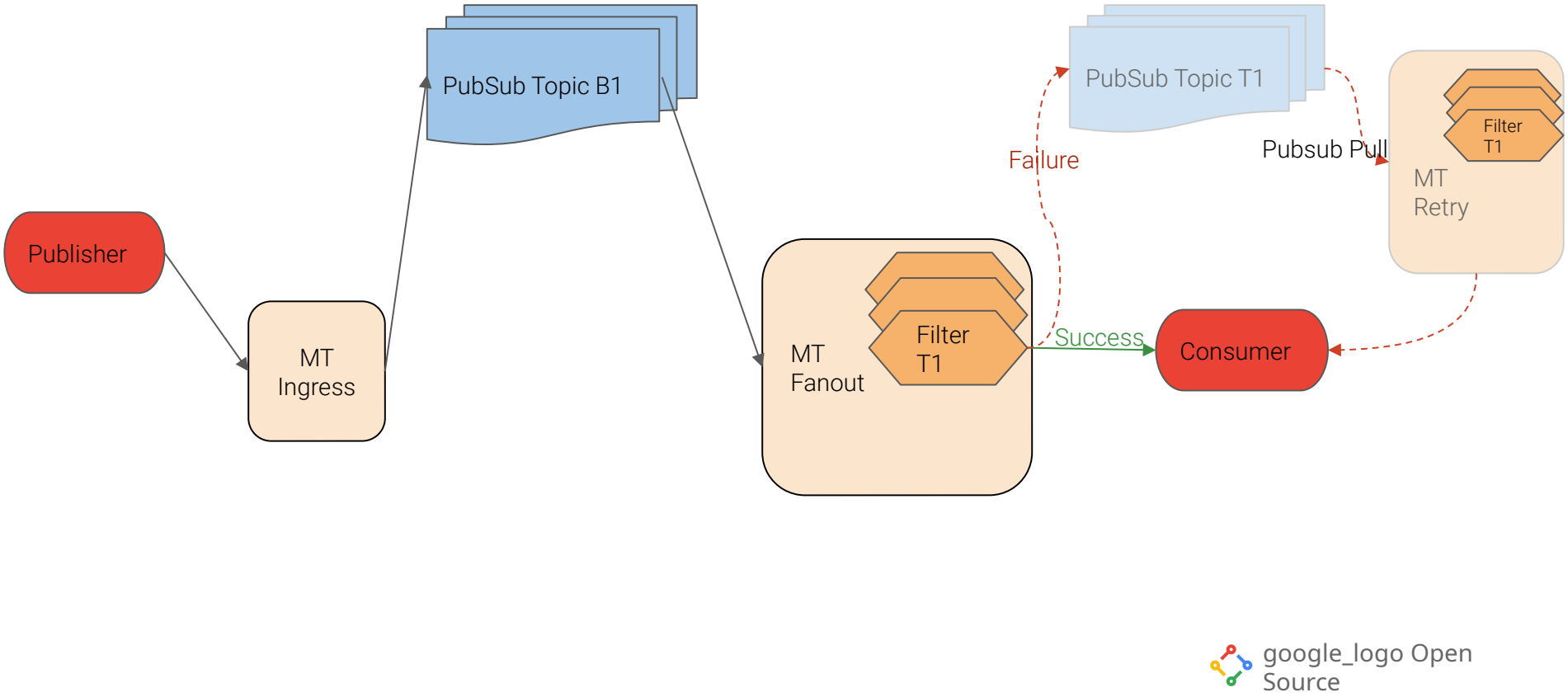

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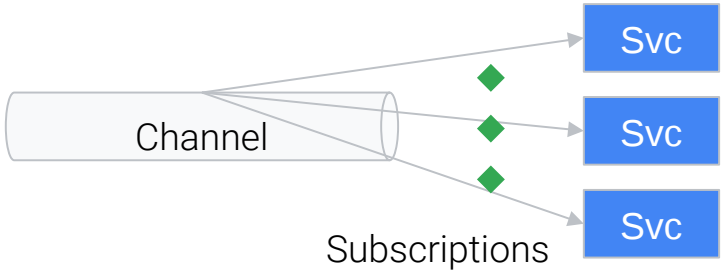
Primitives - Messaging

- Channel (https://knative.dev/docs/eventing/channels/)
- Subscription



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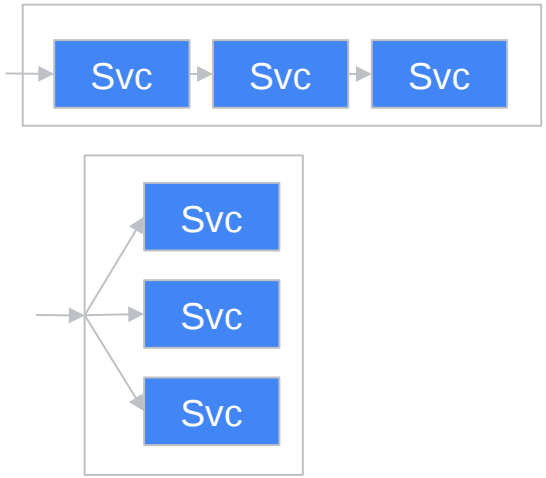
Primitives - Flows

- Sequence (https://knative.dev/docs/eventing/flows/sequence/)
- Parallel (https://knative.dev/docs/eventing/flows/parallel/)



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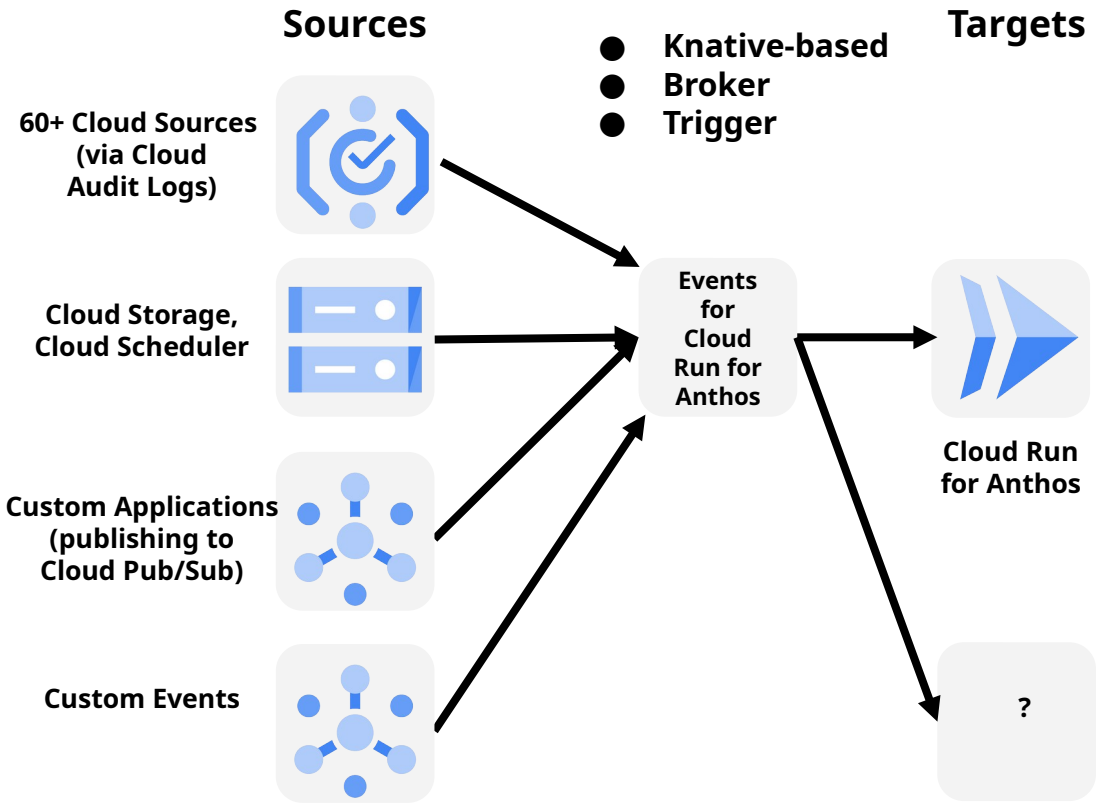
Events for Cloud Run for Anthos



Google Cloud

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Knative Community

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Vibrant community

Two core components - Serving and Eventing

10 active Working Groups with 450+ contributors

15+ active repositories

7 knative-based offerings from vendors such as Google, IBM, Red Hat, TriggerMesh, and VMWare.

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Knative Partners

vmware

SAP

redhat.

IBM

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What next?

Learn About Knative

https://knative.dev/docs/

Try our GCP implementation

https://cloud.google.com/run/docs/events/anthos/quickstart

View us on Github

https://github.com/knative

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Next events on Google Open Source Live

Go Day

Nov 5, 9-11am PT

https://goo.gle/GoDayNov5

Golang experts will share updates on everything from **Go basics** to **Package Discovery** and **Editor Tooling**. Our partner, **Khan Academy** will also walk through an interesting use case about how the organization is using Go to save time and money.

Kubernetes Day

Dec 3, 9-11 am PT

http://goo.gle/k8sDay

At this event, Kubernetes experts at Google will cover the life of a **Kubernetes API**, **admission** webhooks, how "**apply**" works, and the distributed value store **etcd**.

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Thank you!

We want to hear from you!
To discuss needs, use cases, or feedback reach out to
bryanzimmerman@google.com

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