

O'REILLY

Flow Architectures

The Future of Streaming and
Event-Driven Integration



James Urquhart

Event-Driven Integration Today and Tomorrow

Understanding Flow, Protoflows and The
“World Wide Flow”

James Urquhart
Principal Technologist, VMware

BROUGHT TO YOU BY AWS AND PARTNERS

GOTO

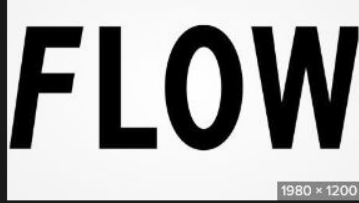
EDA DAY 2023



Pin on Psychology
br.pinterest.com



Chapter 1, Pipe Flow 1 Single-phase...
drbratland.com



Flow Festival develops environmental initiativ...
festivalinsights.com



40 Fantastic Flow Chart Templates [Word, Excel, P...
templatelab.com



Cross-Functional Flowcharts Sol...
conceptdraw.com



Process Flow Chart. Process Unders...
presentationeze.com



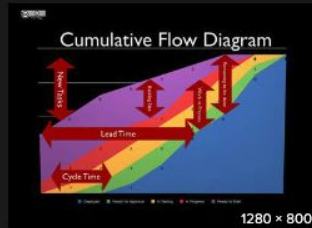
30+ Flow
visme.co



Welcome to FLOW: What is FLOW? | Edits...
editshare.com



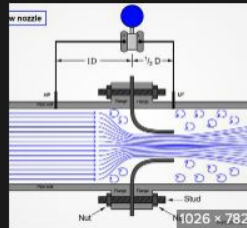
9 Free Microsoft Visio Alternatives - Flo...
geckoandfly.com



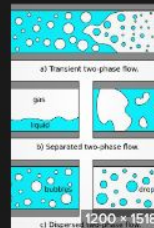
Cumulative Flow Diagram | Wall-Skills.c...
wall-skills.com



flow on Behance
behance.net



Different Types of Flow Elemen...
instrumentationtools.com



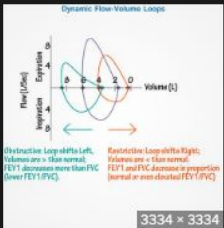
Two-phase flow - ...
en.wikipedia.org



Flow - YouTube
youtube.com



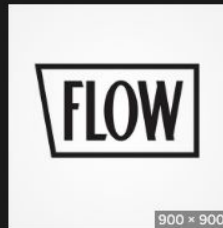
Monday Minute: Crea...
stummingames.com



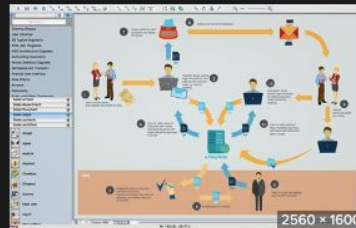
Pathology Glossary: Flow-V...
drawittoknowit.com



The Neuroscience ...
pinterest.de



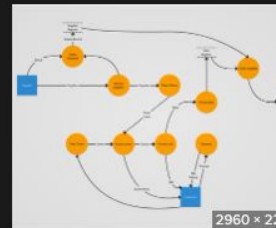
THE-FLOW - YouTube
youtube.com



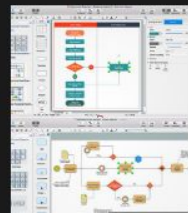
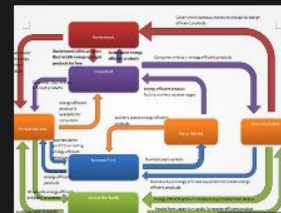
Process Flow Diagram Symbols : Process Flow...
dilakhun.blogspot.com



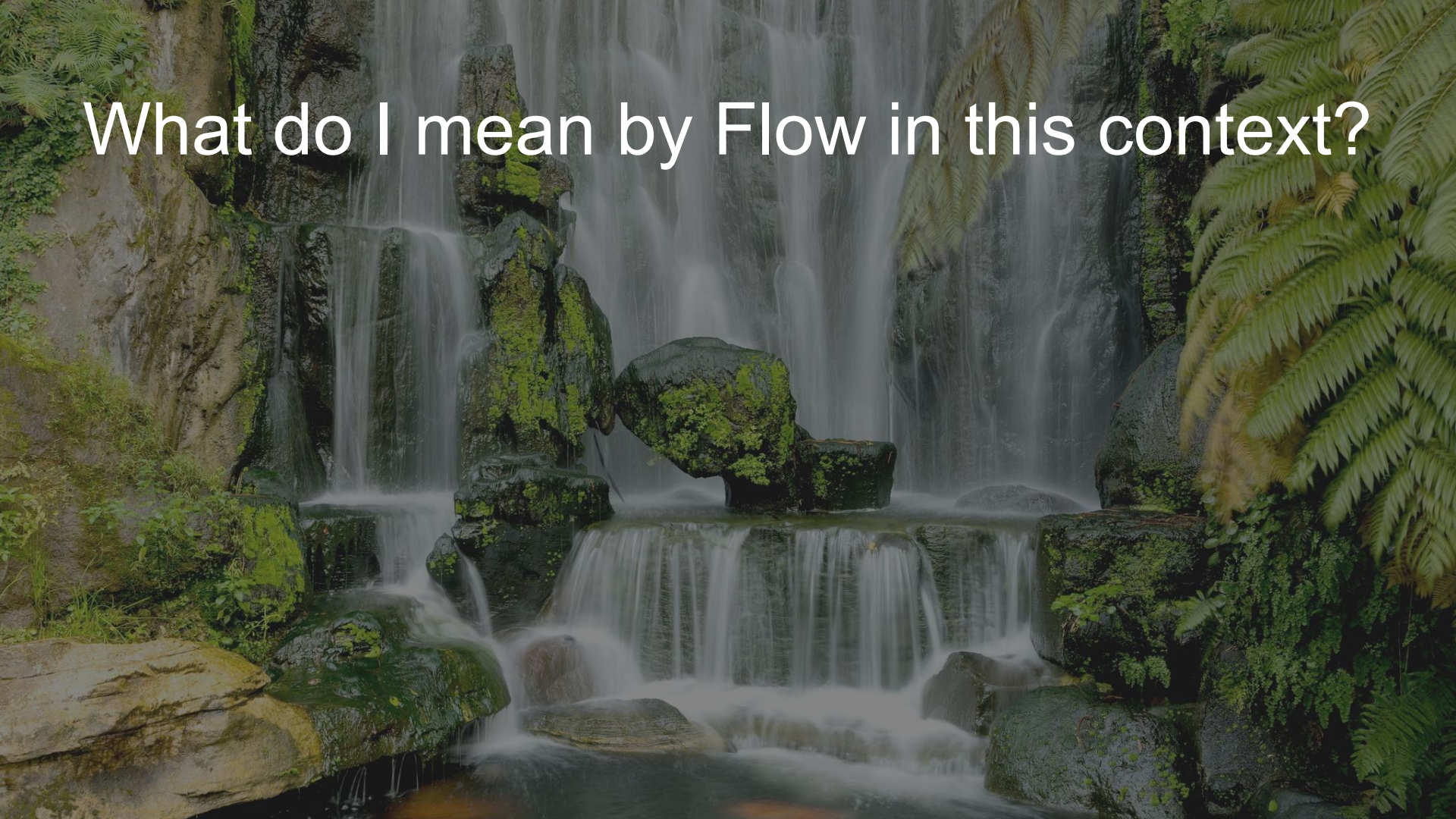
Finding the worship flow; 3 ways to break your p...
themusicministrycoach.com



Data Flow Diagram Level 1 For Shop
komsca.blogspot.com



What do I mean by Flow in this context?



A long-exposure photograph of a waterfall cascading over moss-covered rocks in a lush, green forest. The water appears as a soft, white veil, and the surrounding vegetation, including large ferns, is vibrant and detailed.

What do I mean by Flow in this context?

Event-Driven Integration



What do I mean by Flow in this context?

Event-Driven Integration

Across

Organization Boundaries



What do I mean by Flow in this context?

Event-Driven Integration

Across

Organization Boundaries

Through

Standard Interfaces and Protocols

What is “Flow”?

Event-Driven Integration
Across
Organization Boundaries
Through
Standard Interfaces and Protocols

Consumers (or their agents) request connections to **producer streams** through standard self-service interfaces.

What is “Flow”?

Event-Driven Integration
Across
Organization Boundaries
Through
Standard Interfaces and Protocols

Producers (or their agents) chose which requests to accept or reject.

What is “Flow”?

Event-Driven Integration
Across
Organization Boundaries
Through
Standard Interfaces and Protocols

Consumers (or their agents) do not need to actively request data—events are pushed to them as they are available.

What is “Flow”?

Event-Driven Integration
Across
Organization Boundaries
Through
Standard Interfaces and Protocols

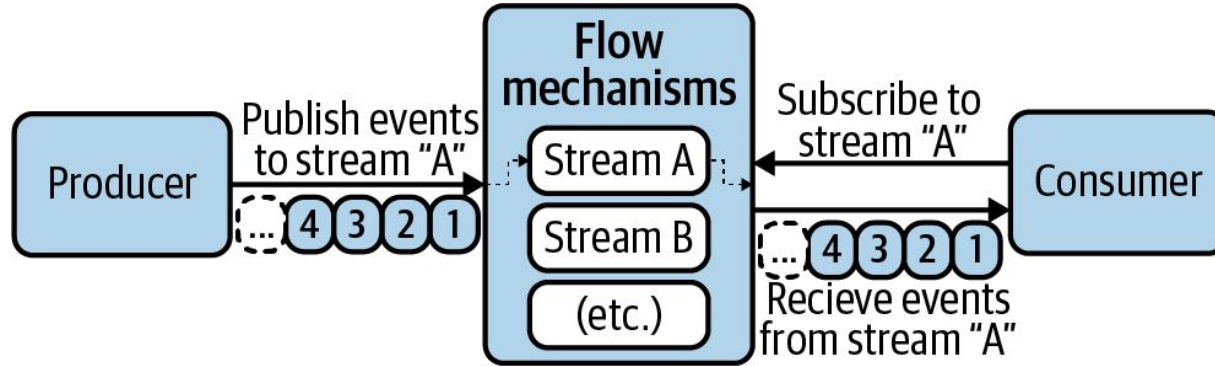
Producers (or their agents) maintain control of what events are transmitted to whom, when.

What is “Flow”?

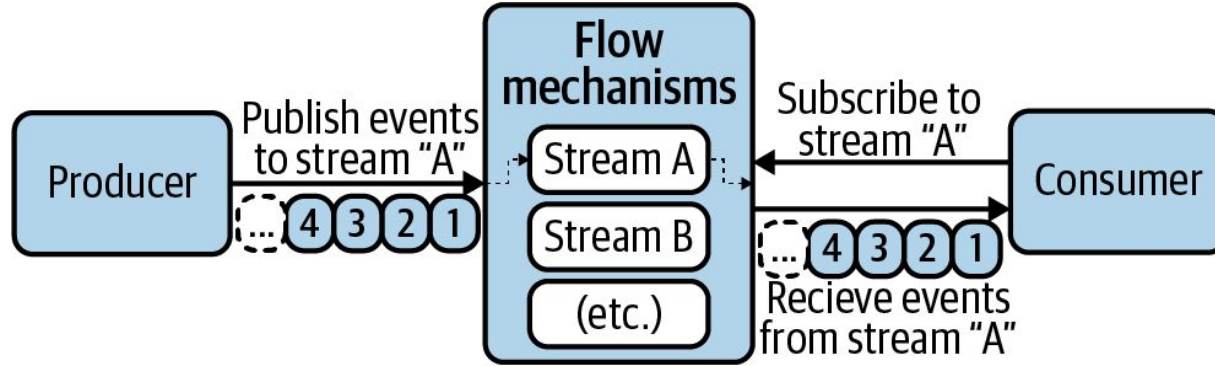
Event-Driven Integration
Across
Organization Boundaries
Through
Standard Interfaces and Protocols

Events are transmitted over the network using standard protocols, including to-be-determined protocols specifically designed for flow mechanics.

Sounds like PubSub...

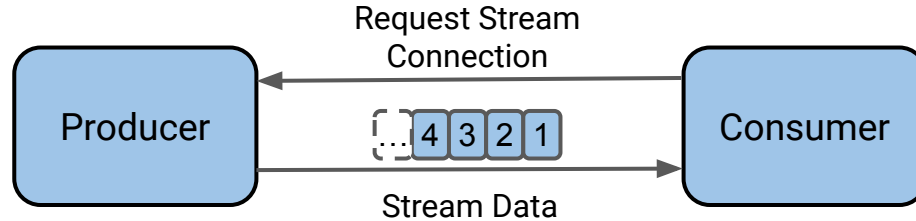


Sounds like PubSub...



Sure...but...

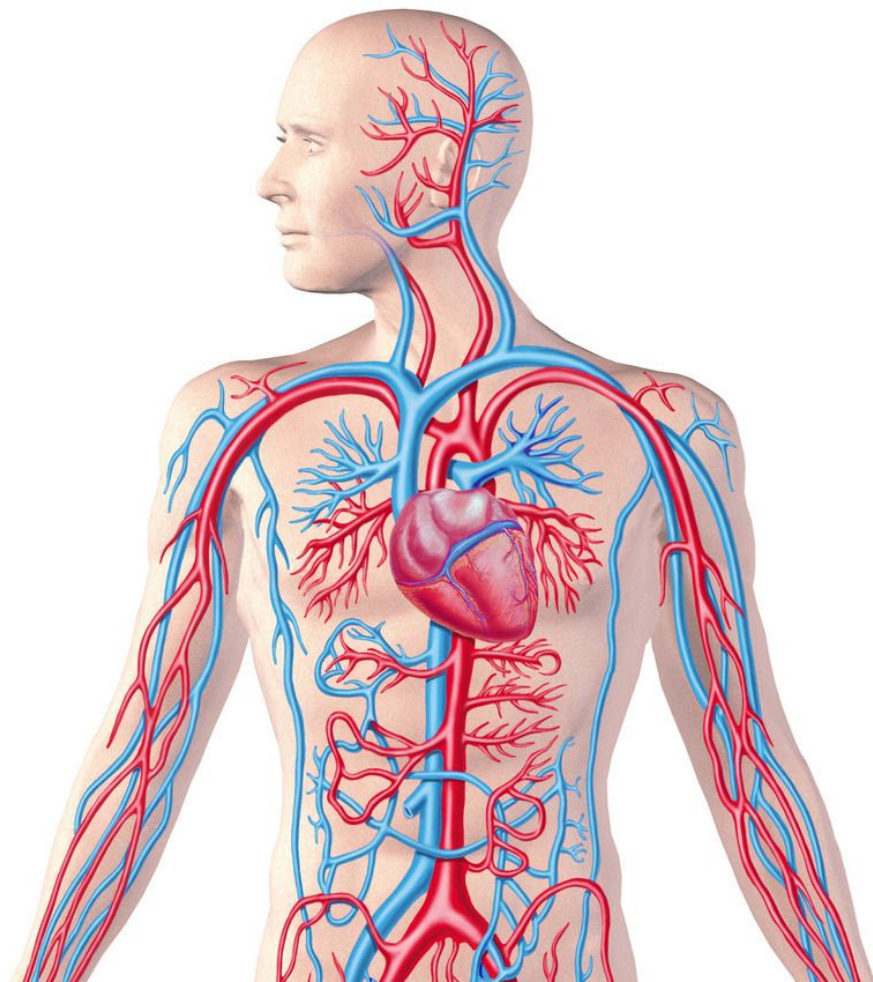
Sounds like PubSub...



HTTP + WebSocket (for example) would qualify,
if the other conditions are met.

**Why is
FLOW
Important?**



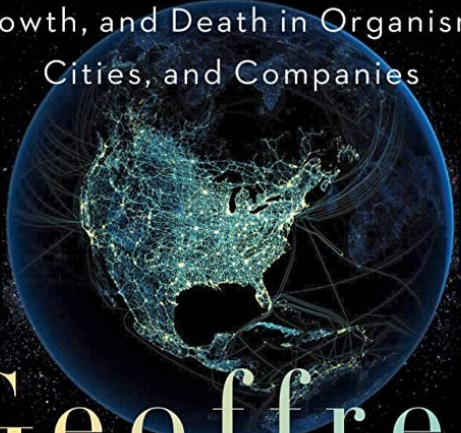




"An enchanting intellectual odyssey . . . provocative and fascinating."
—THE NEW YORK TIMES

SCALE

The Universal Laws of Life,
Growth, and Death in Organisms,
Cities, and Companies



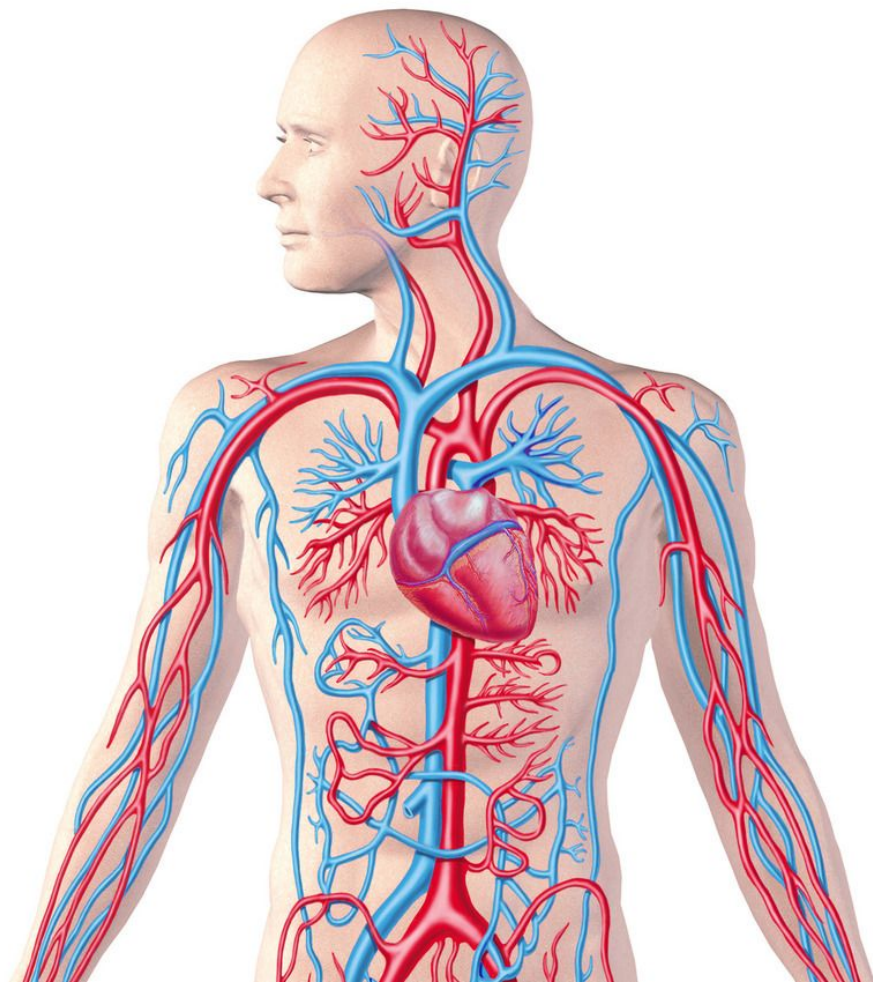
Geoffrey
West





**What is
FLOW'S
“FORCE”**



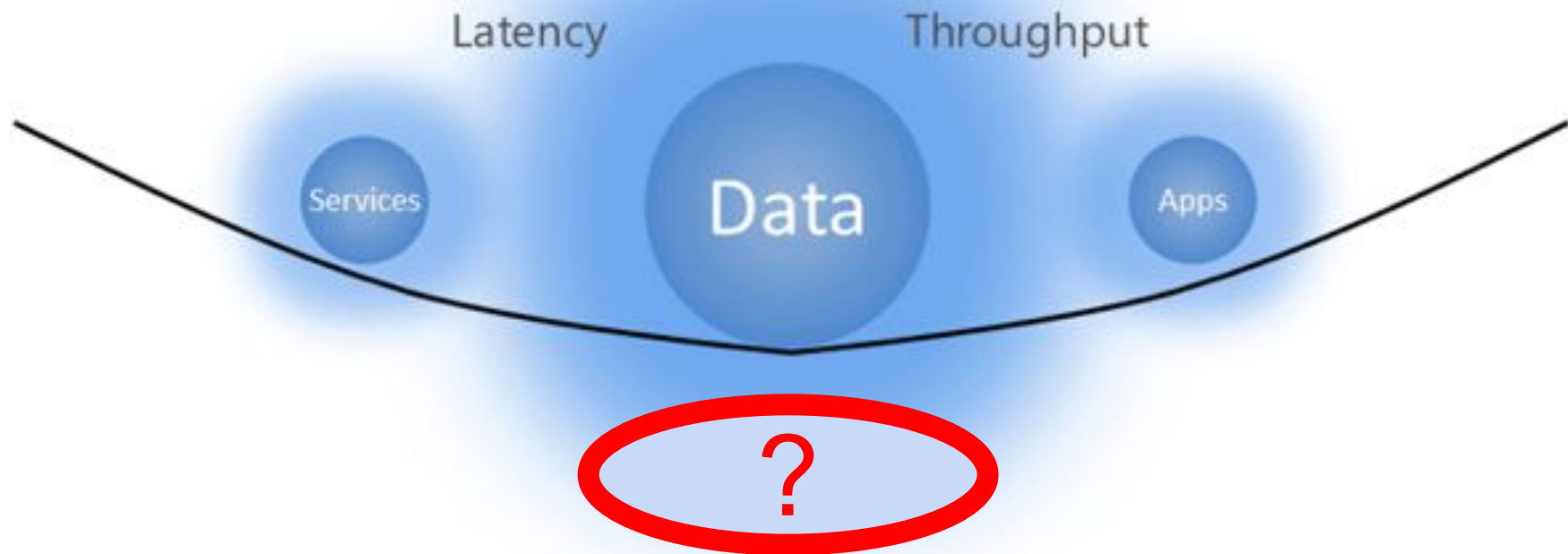




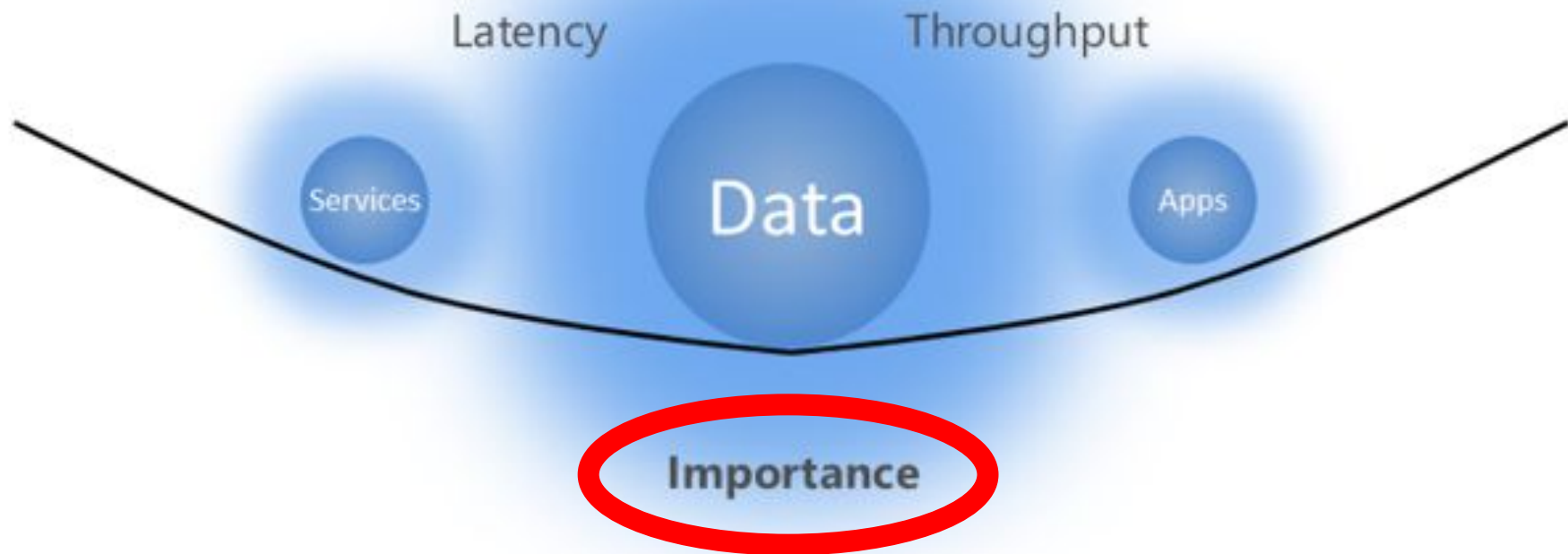
A scenic photograph of a river flowing through a forest. The river is filled with white water rapids and cascades over numerous dark, mossy rocks. The surrounding forest is lush with green trees and foliage, creating a dense canopy. The word "GRAVITY" is overlaid in large, bold, white capital letters across the center of the image, emphasizing the force driving the water's flow.

GRAVITY

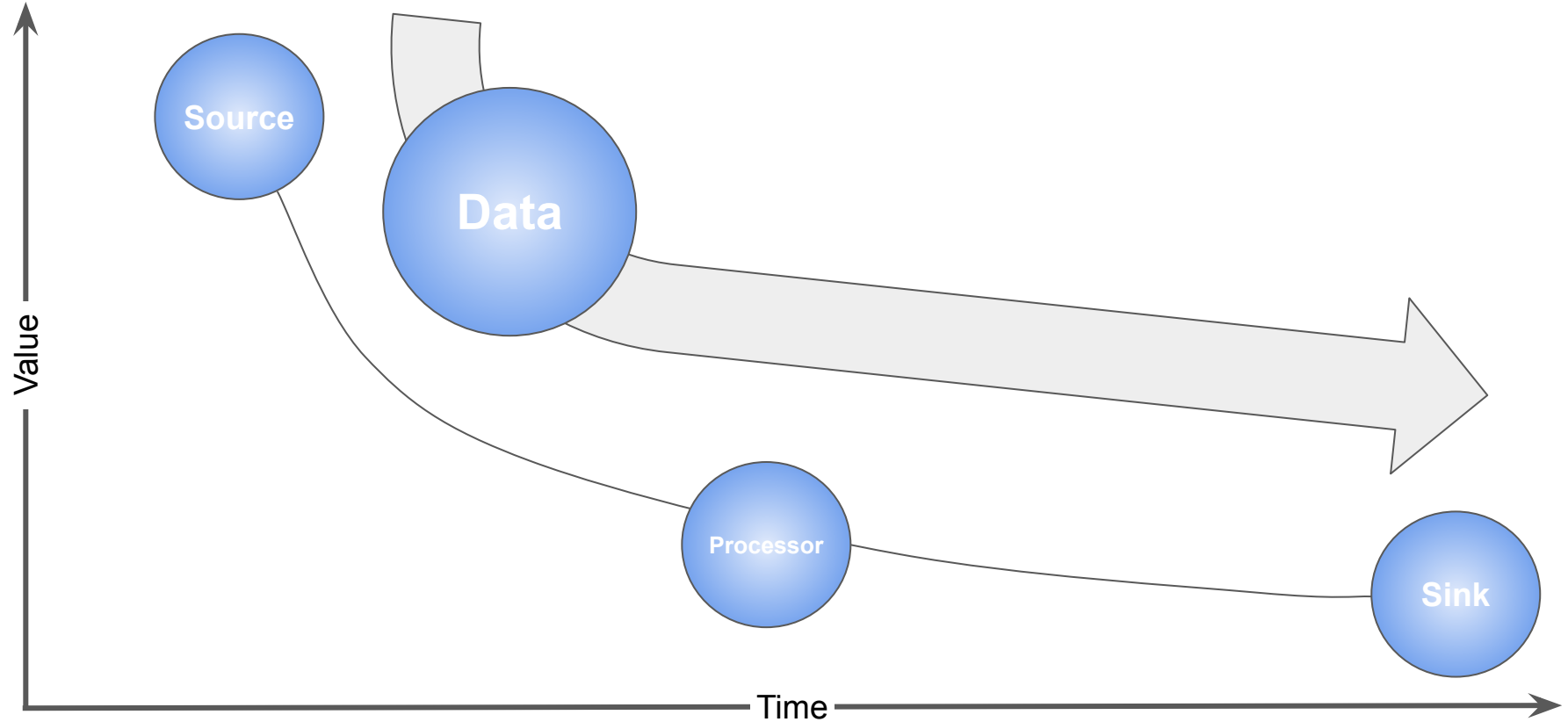
Principles of data gravity



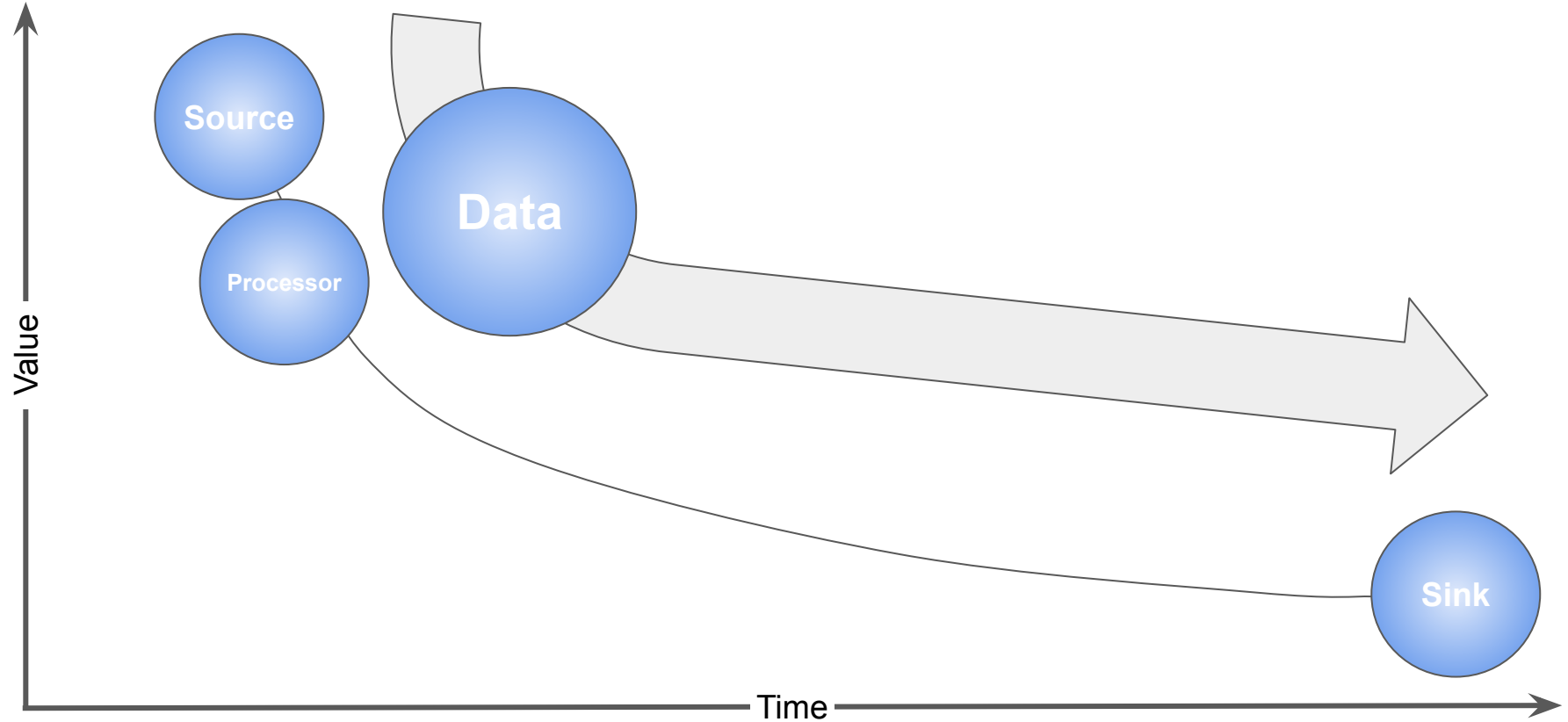
Principles of data gravity



Principles of data flow



Principles of data flow

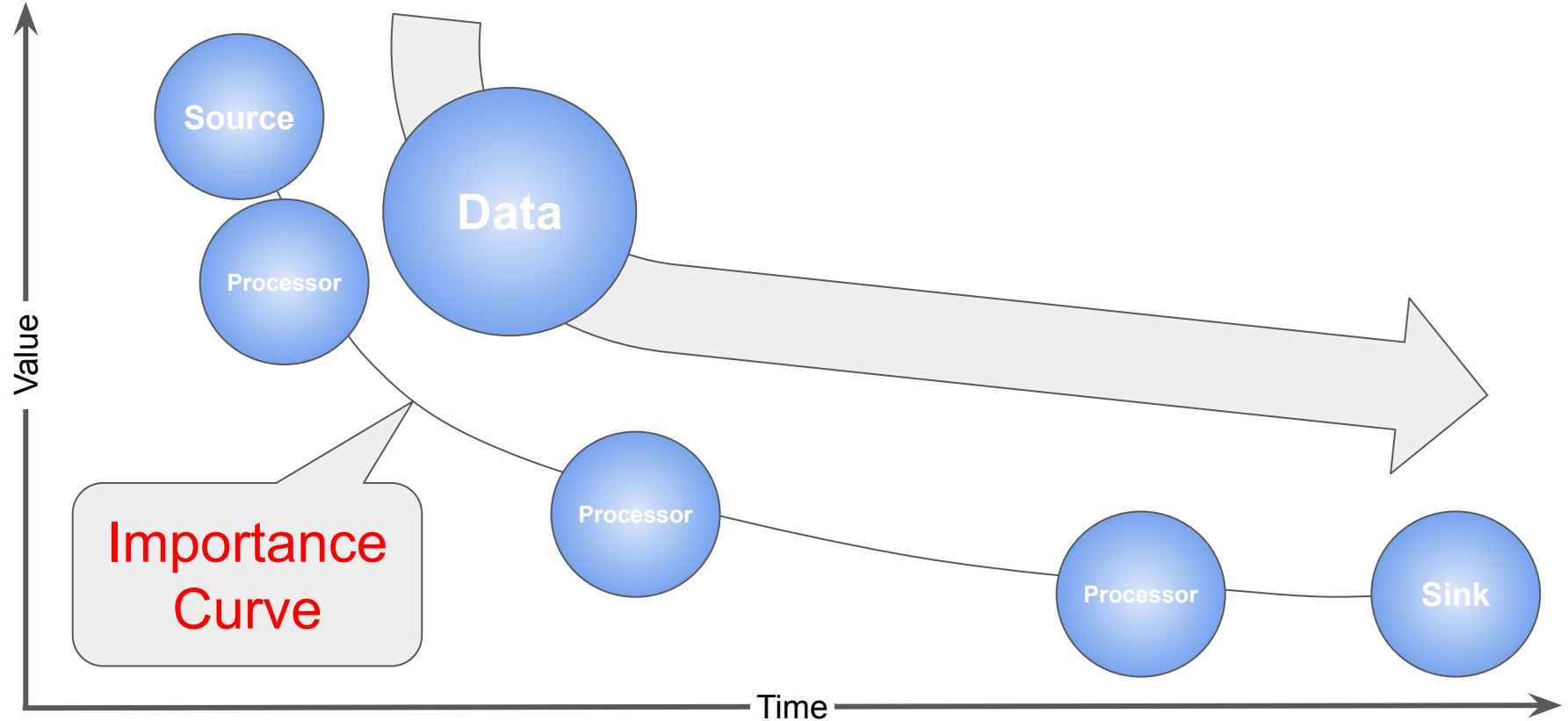


**FLOW +
GRAVITY**

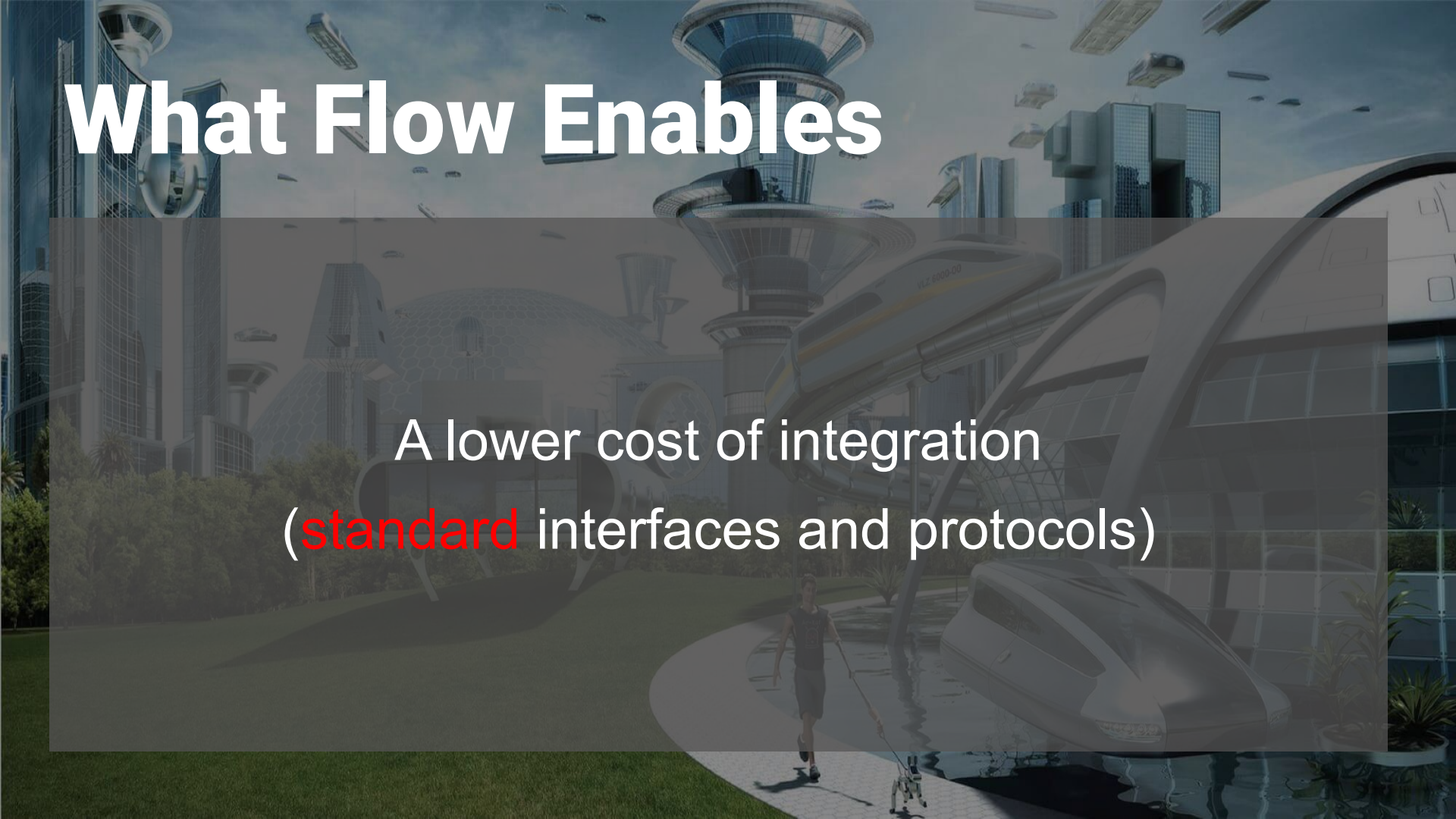




Principles of data flow

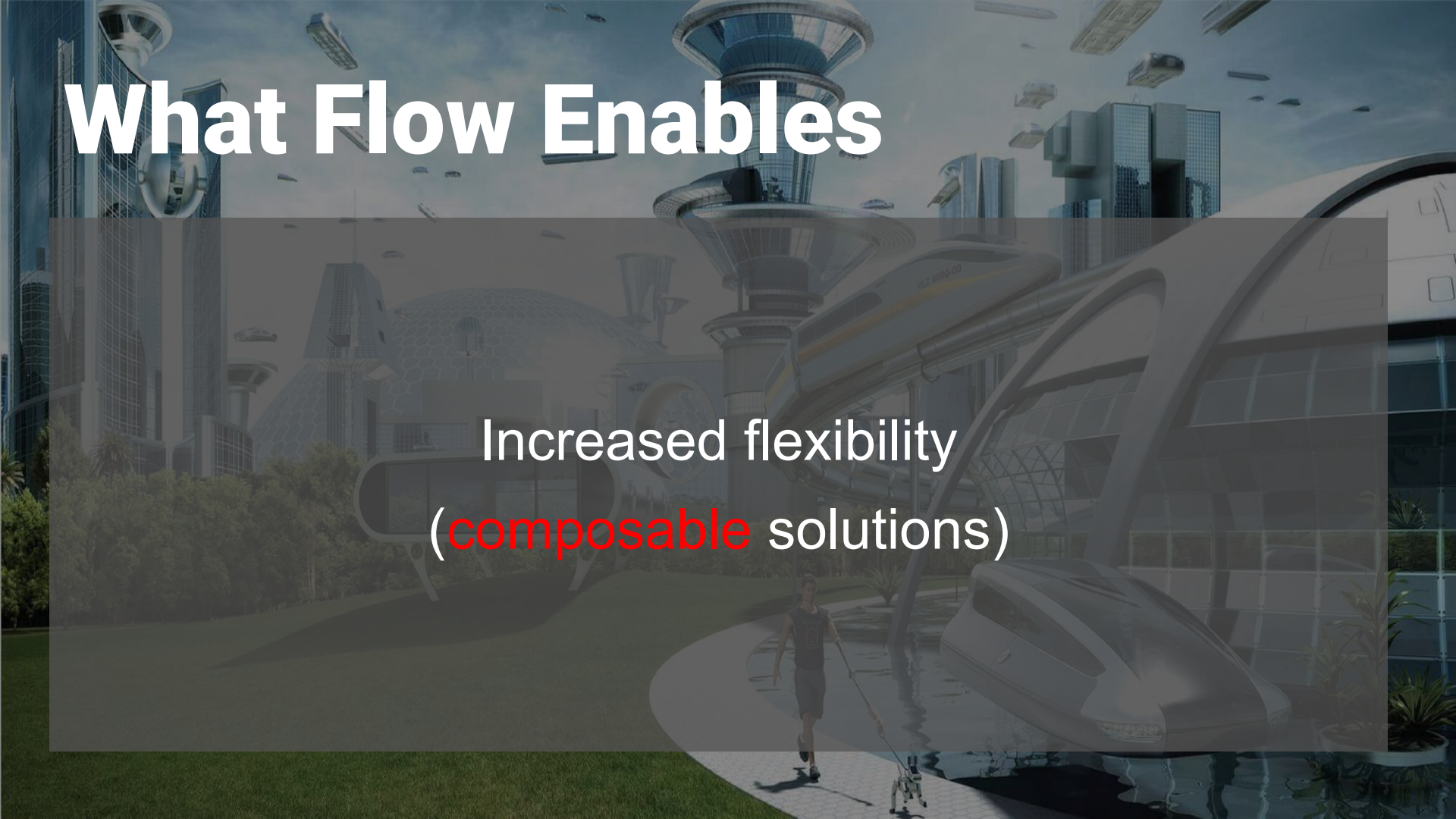


What Flow Enables

A futuristic cityscape with flying cars and a person walking a dog in the foreground. The scene is set in a modern, high-tech environment with various architectural structures and a clear sky.

A lower cost of integration
(**standard** interfaces and protocols)

What Flow Enables

A futuristic cityscape with flying cars and a person walking a dog in the foreground. The scene is set in a modern, high-tech environment with various architectural structures and a clear sky. The text is overlaid on a semi-transparent dark grey rectangle.

Increased flexibility
(composable solutions)

What Flow Enables

A rich solution ecosystem
(**interoperable** data flows)

Jevons Paradox:

“In economics, the Jevons paradox occurs when technological progress or government policy increases the efficiency with which a resource is used, but the falling cost of use induces increases in demand enough that resource use is increased, rather than reduced.”



If you lower the cost of integration by order(s) of magnitude, you will drive significantly more use of real time streaming integration.



EDA

Today

EDA Today: Understanding Use Cases

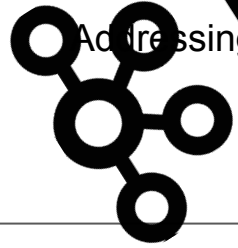
Addressing and Discovery

Command and Control

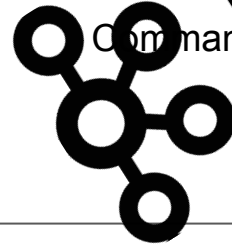
Query and Observability

Telemetry and Analytics

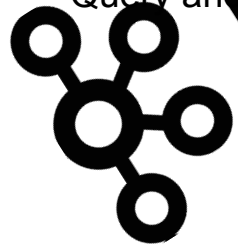
EDA Today: Understanding Use Cases



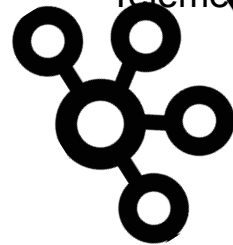
Addressing and Discovery



Command and Control



Query and Observability



Telemetry and Analytics

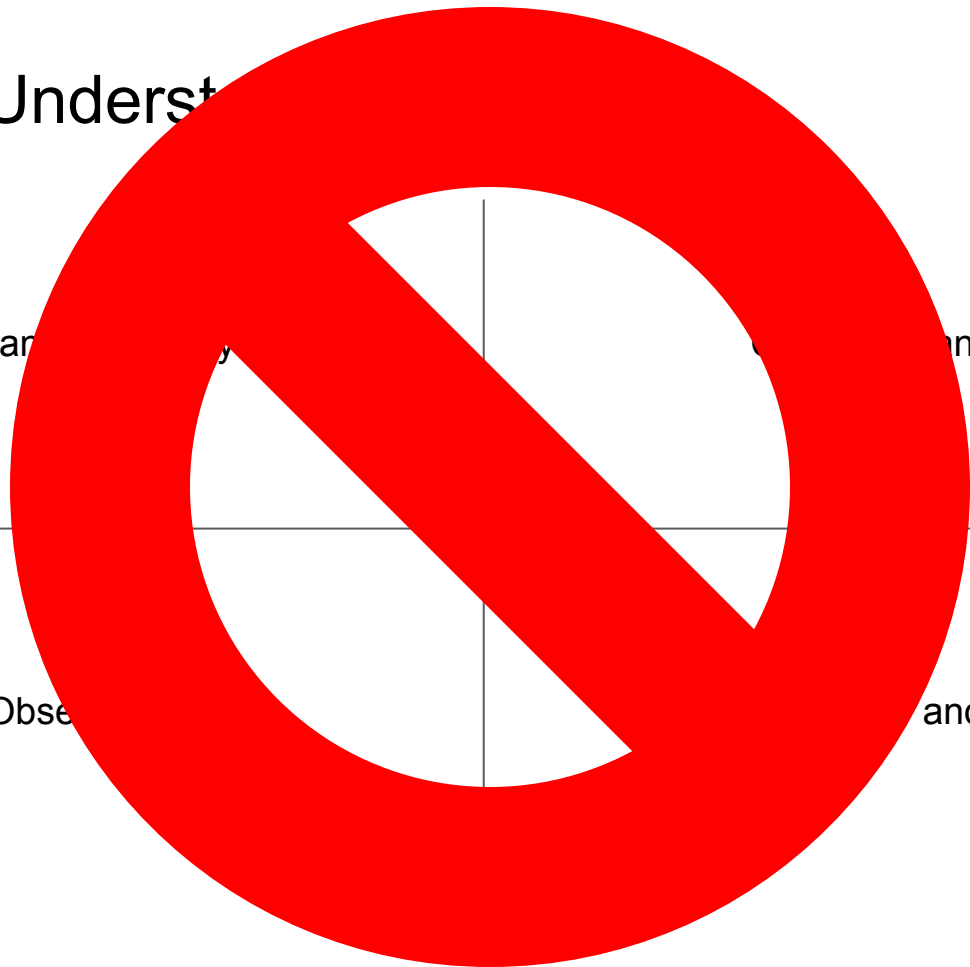
EDA Today: Understanding Use Cases

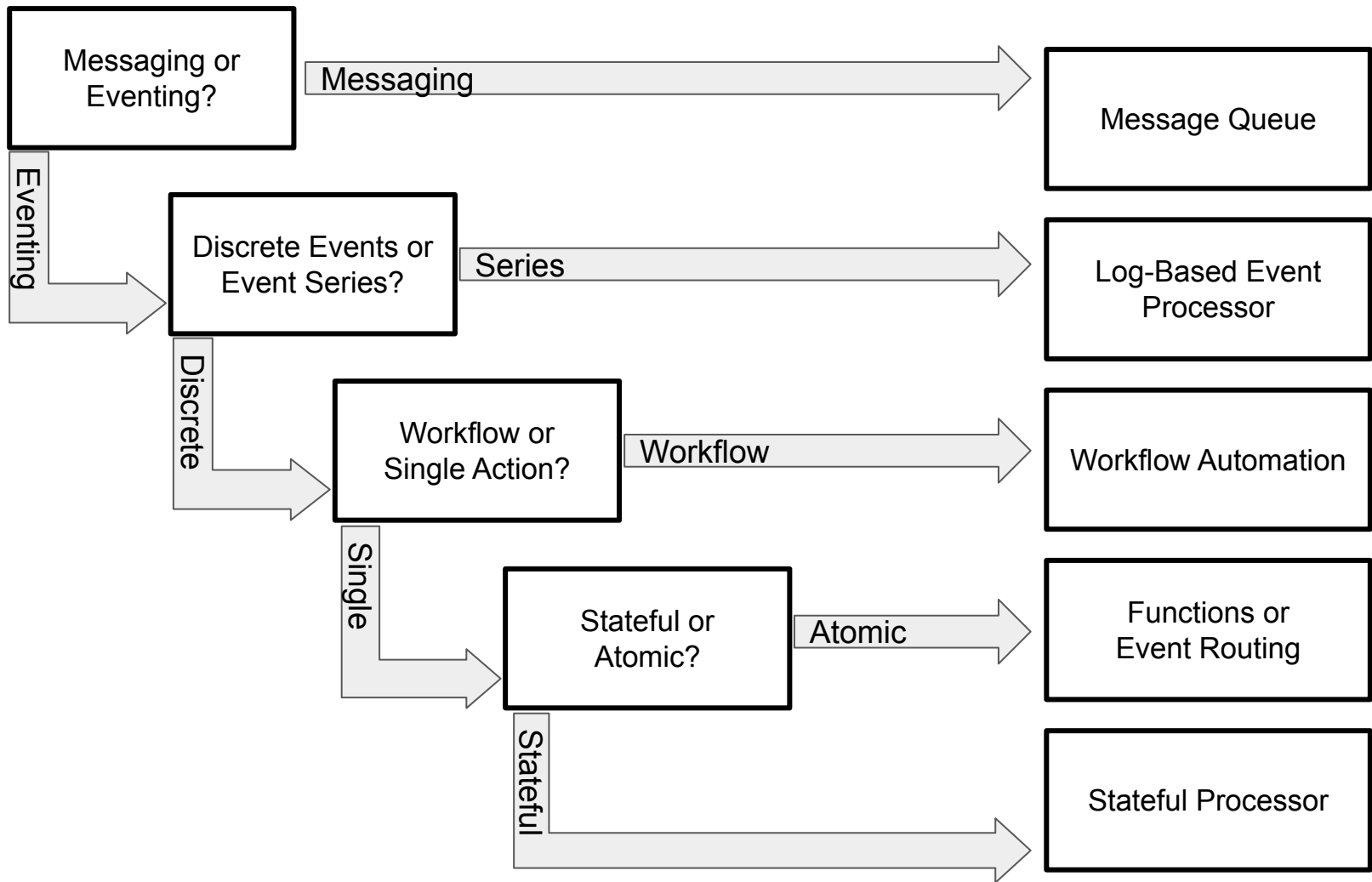


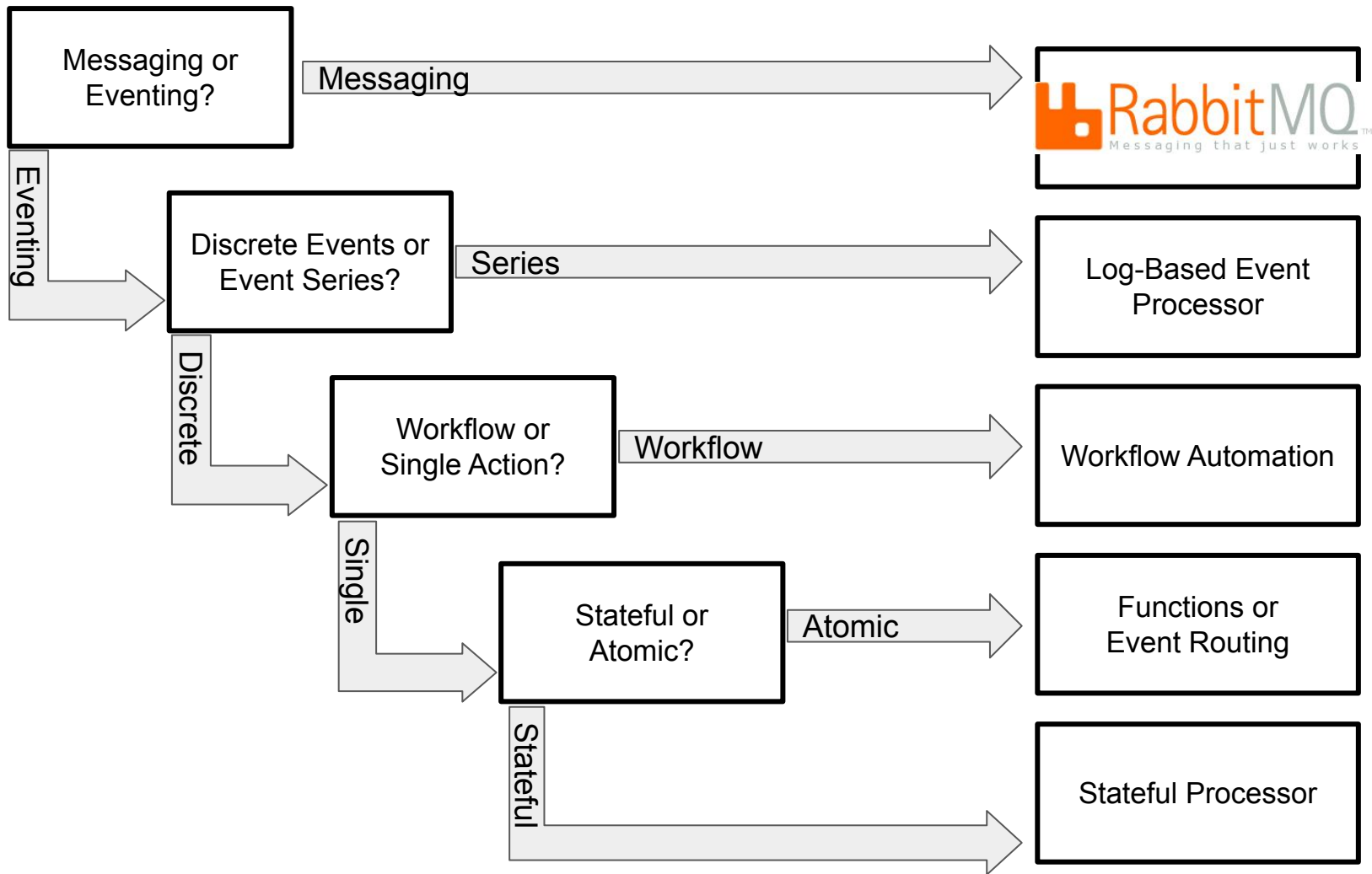
EDA Today: Understanding

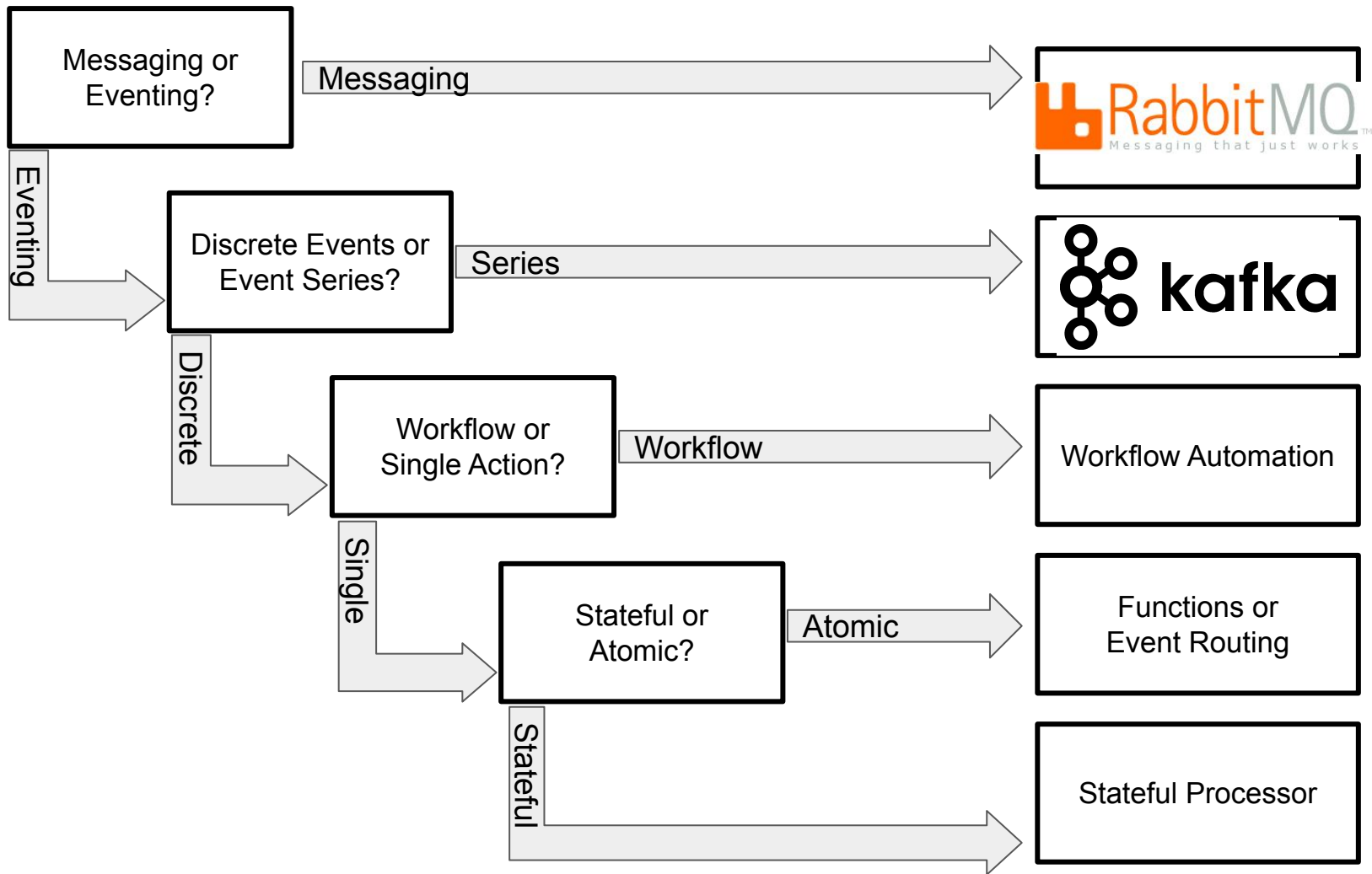
Addressing and Control

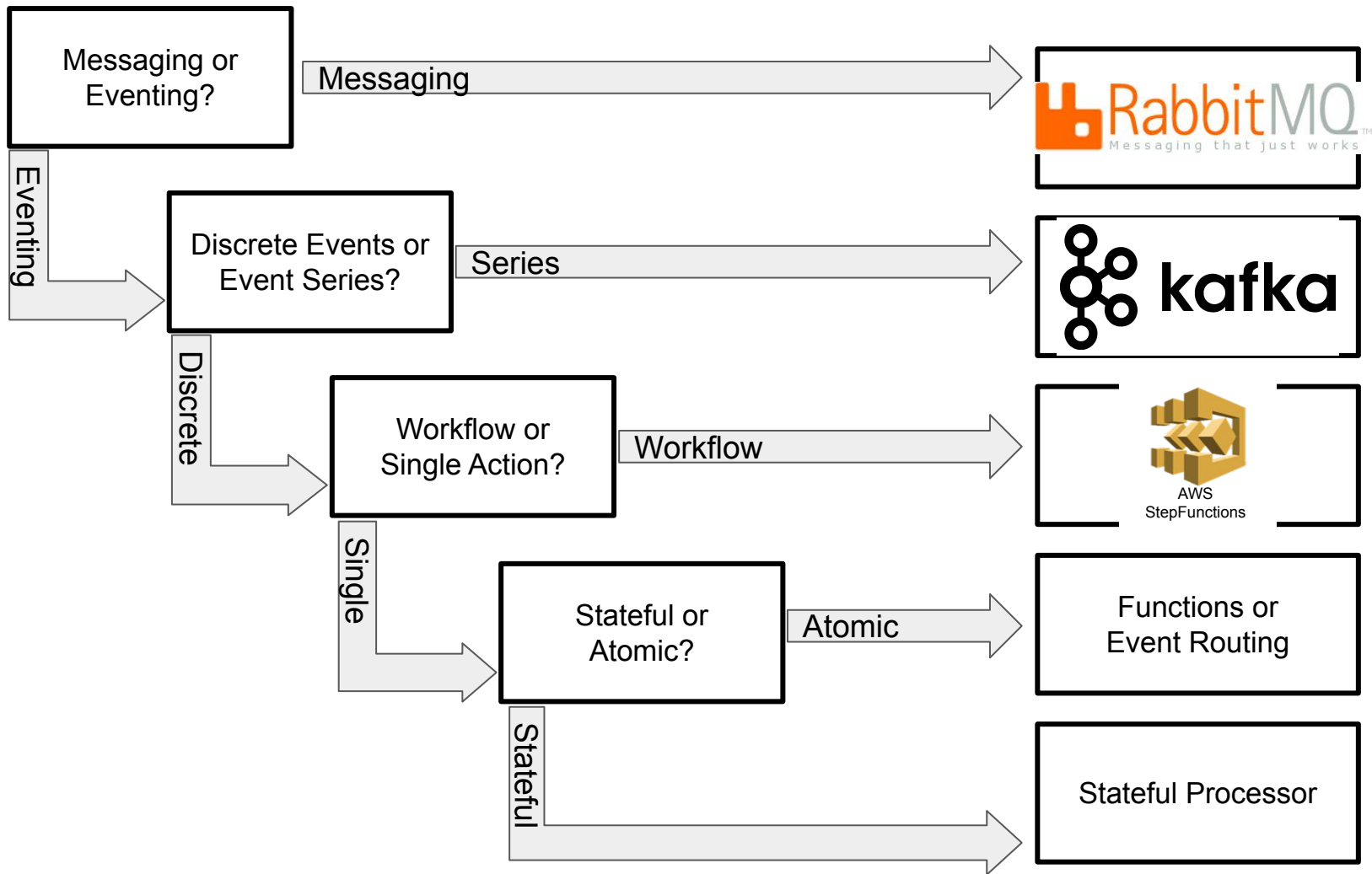
Query and Observation and Analytics

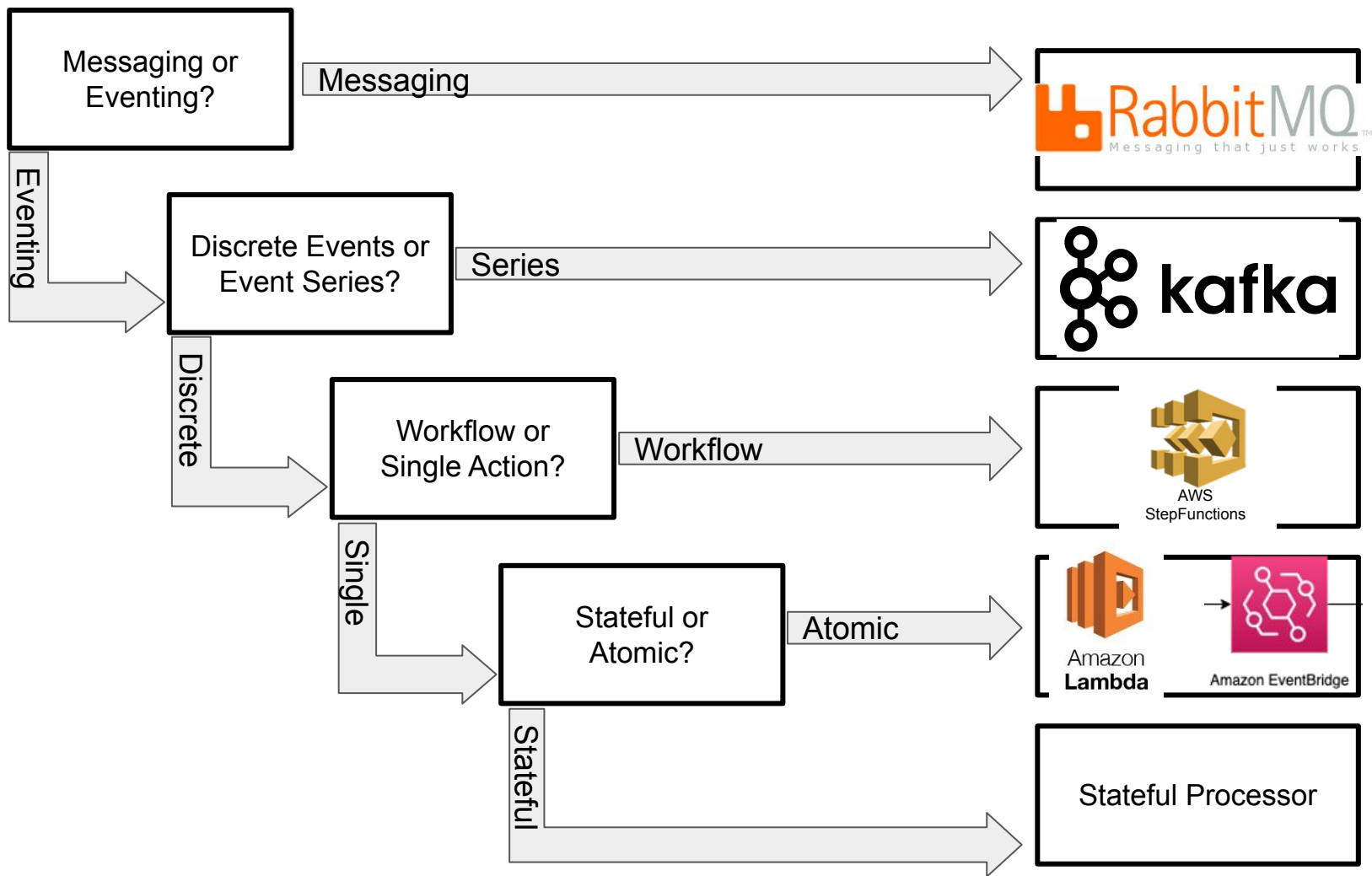


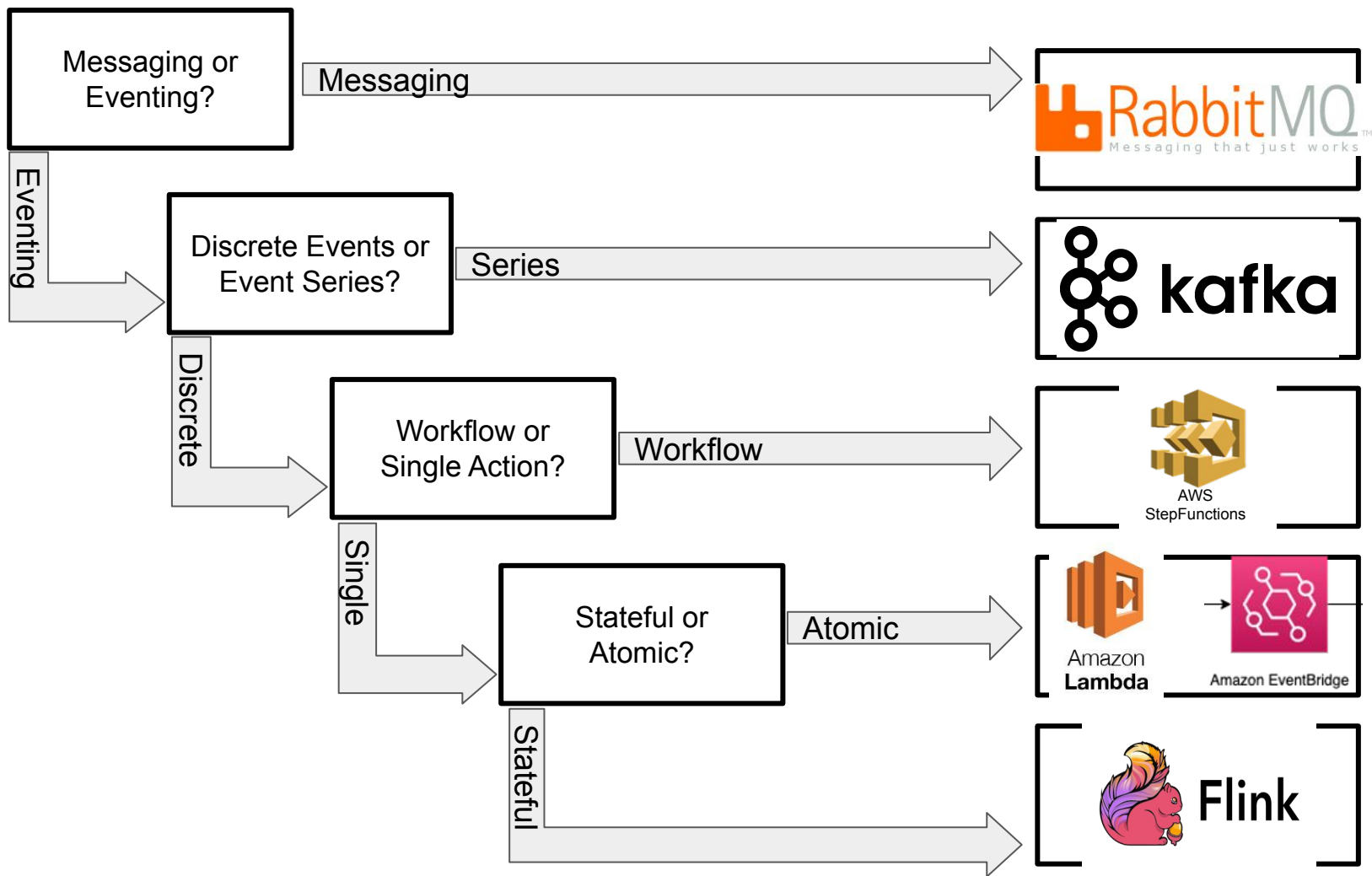






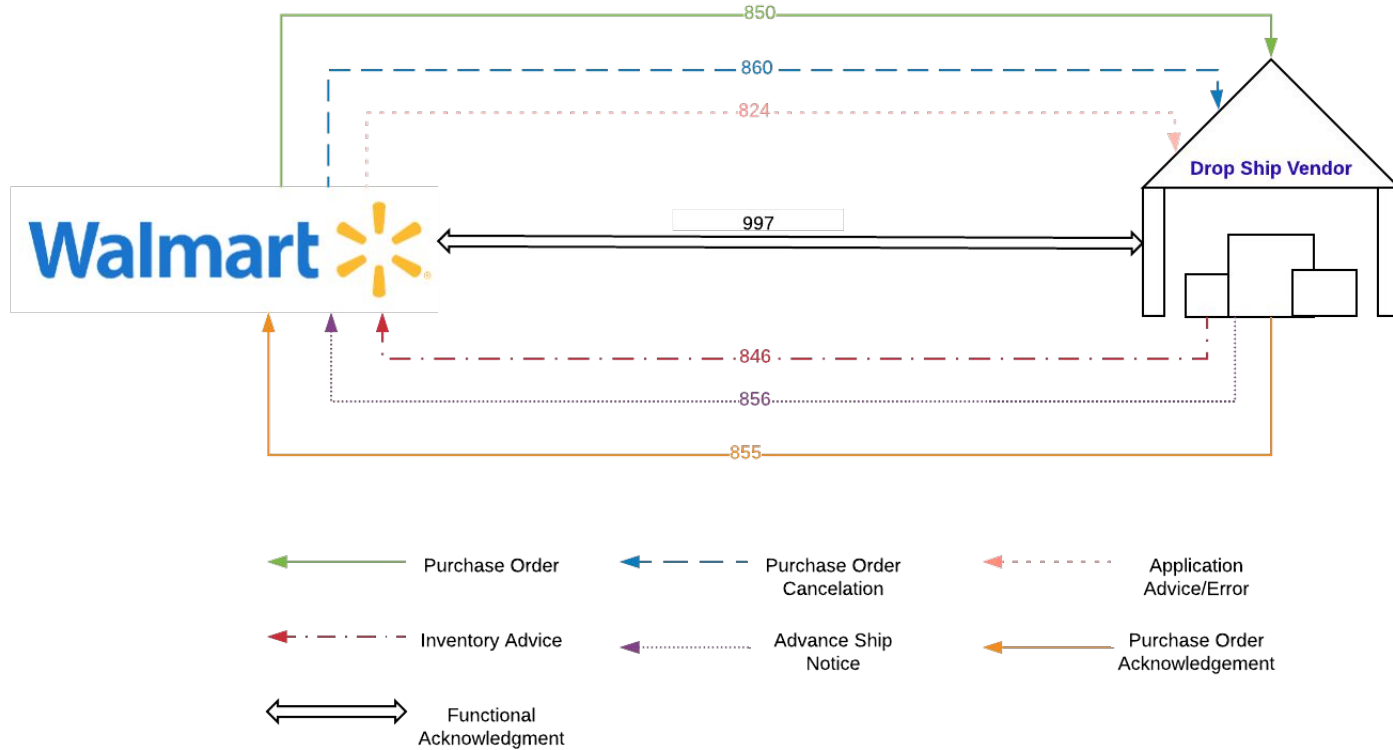






PROTOWS

EDI



JMS



Federal Aviation Administration

[Catalog](#)[Sign Up](#)[Login](#)

En Route Flight and Related Data

These data services provide En Route Flight and other Related Data. These SOA-based services are available to consumers and include flight and track data, airspace data, operational data, and general message data. Consumers can subscribe to a continuous stream of Java Message Service (JMS) data and/or request finite sets of data using web service interfaces, which are also delivered via JMS.

Datasets

This service has the following datasets available:

- *En Route Airspace Data* - Includes sector status and configuration; route status; Special Activity Airspace (SAA) status; and altimeter settings.

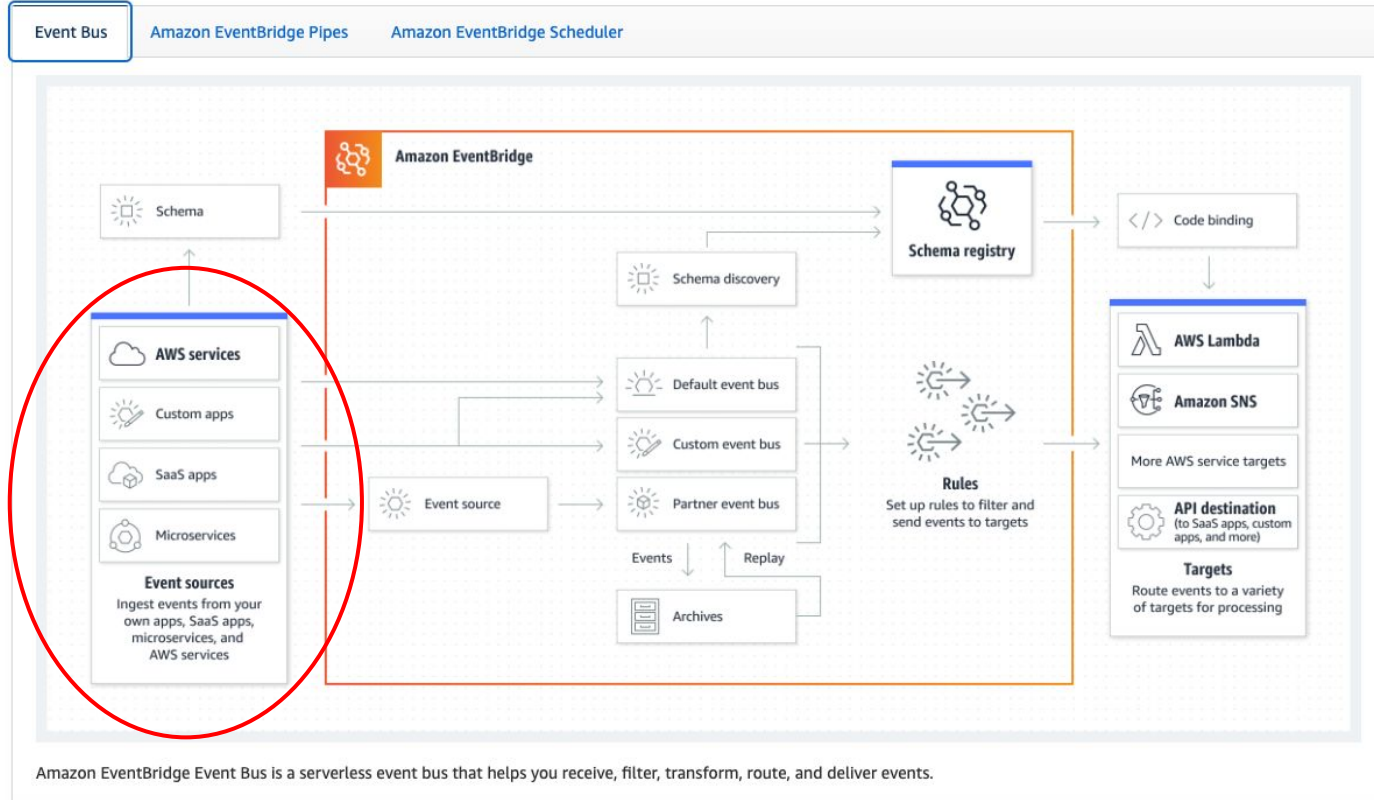
[Request Access](#)

- *En Route Flight Data* - Includes proposed and active flight plans, including amendment information; track data associated with active flights; and arrival, departure, and cancellation information.

[Request Access](#)

- *En Route General Message Data* - Includes general information messages and other information messages including interim altitude and hold status information. General information messages are ad-hoc, free form text messages entered by users to exchange information.

Amazon EventBridge



Getting to the World Wide Flow

Promising Interfaces and Protocols

Protocols:

Event Metadata Protocol:

CloudEvents

Wire Protocols:

HTTP

MQTT

AMQP

WebSockets

Interfaces:

Publish-Subscribe:

MQTT

NATS.io/Synadia

Kafka API

RabbitMQ API

Etc.

Subscription focused:

CloudEvents Subscription API

AsyncAPI

Discovery:

CloudEvents Discovery API

Google+Web

CloudEvents (Version 1.0.2)

Table of Contents

- Overview
- Notations and Terminology
- Context Attributes
- Event Data
- Size Limits
- Privacy & Security
- Example

SDKs

- Go
- JavaScript
- Java
- C#
- Ruby
- Python
- Rust

Integrations

- Alibaba Cloud EventBridge
- Argo Events
- Azure Event Grid
- Choria
- commercetools
- Debezium
- Falco
- Google Cloud Eventarc
- IBM Cloud Code Engine
- Keptn
- Knative Eventing
- Kogito
- OpenFaaS
- Oracle Cloud
- Serverless.com Event Gateway
- Serverless Workflow
- Tekton Pipelines
- TriggerMesh
- VMware Event Broker Appliance

Type System

The following abstract data types are available for use in attributes. Each of these types MAY be represented differently by different event formats and in protocol metadata fields. This specification defines a canonical string-encoding for each type that MUST be supported by all implementations.

REQUIRED Attributes

The following attributes are REQUIRED to be present in all CloudEvents:

- **Boolean** - a boolean
 - String encoding
 - **Integer** - A whole number
 - String encoding
 - **String** - Sequence of characters
 - the "control character" for line ending, a backslash followed by the letter n
 - code points
 - code points
 - Thus (in JSON)
 - **Binary** - Sequence of bytes
 - String encoding
 - **URI** - Absolute or relative
 - String encoding
 - **URI-reference** - A reference to a resource
 - String encoding
 - **Timestamp** - Date and time
 - String encoding
- The following attributes are REQUIRED:
- **Type**: **String**
 - **Description**: Identifies the event (e.g. due to a network failure).
 - **Examples**:
 - An event counter maintained by the organization
 - A UUID
 - **Constraints**:
 - **REQUIRED**
 - **MUST** be a non-empty string
 - **MUST** be unique within the organization

OPTIONAL Attributes

The following attributes are **OPTIONAL** to appear in CloudEvents. See the [Notational Conventions](#) section for more information on the definition of **OPTIONAL**.

datacontenttype

- **Type:** `String` per RFC 2046
- **Description:** Content type of `data` value. This attribute enables `data` to carry any type of content, whereby format and encoding might differ from that of the chosen event format. For example, an event rendered using the **JSON envelope** format might carry an XML payload in `data`, and the consumer is informed by this attribute being set to `application/xml`. The rules for how `data` content is rendered for different `datacontenttype` values are defined in the event format specifications; for example, the JSON event format defines the relationship in [section 3.1](#).

For some binary mode protocol bindings, this field is directly mapped to the respective protocol's content-type metadata property. Normative rules for the binary mode and the content-type metadata mapping can be found in the respective protocol

In some event formats the `datacontenttype` attribute MAY be omitted. For example, if a JSON format event has no `datacontenttype` attribute, then it is implied that the `data` is a JSON value conforming to the "application/json" media type. In other words: a JSON-format event with no `datacontenttype` is exactly equivalent to one with `datacontenttype="application/json"`.

When translating an event message with no `datacontenttype` attribute to a different format or protocol binding, the target `datacontenttype` SHOULD be set explicitly to the implied `datacontenttype` of the source.

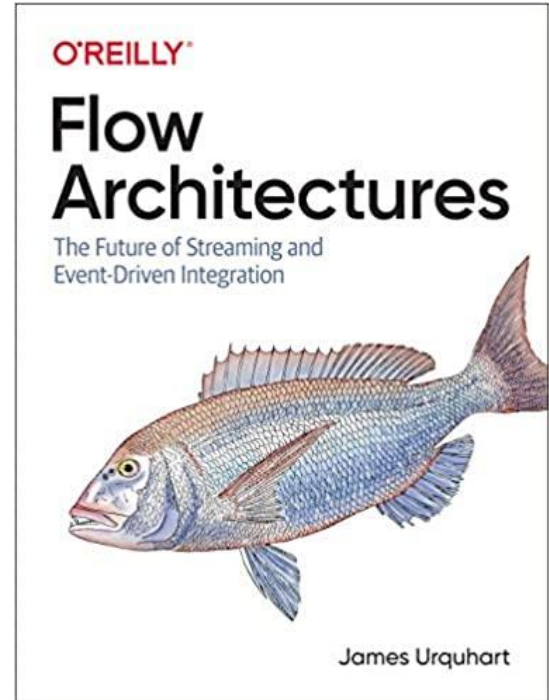
- Constraints:
 - OPTIONAL
 - If present, MUST adhere to the format specified in [RFC 2046](#)
- For Media Type examples see [IANA Media Types](#)

dataschema

- **Type:** `URI`
- **Description:** Identifies the schema that `data` adheres to. Incompatible changes to the schema SHOULD be reflected by a different URI. See [Versioning of Attributes in the Primer](#) for more information.
- **Constraints:**
 - `OPTIONAL`

**AI will need the
World Wide
Flow**

(And buy my book. 😏)



Don't forget to
vote for this session
in the **GOTO Guide app**