So You Want To Build An Event Driven System?

James Eastham
Senior Cloud Architect, AWS
@plantpowerjames

THE MILLION COPY BESTSELLER

Yuval Noah Harari

Sapiens

A Brief History of Humankind

'I would recommend *Sapiens* to anyone who's interested in the history and future of our species'
BILL GATES

VINTAGE

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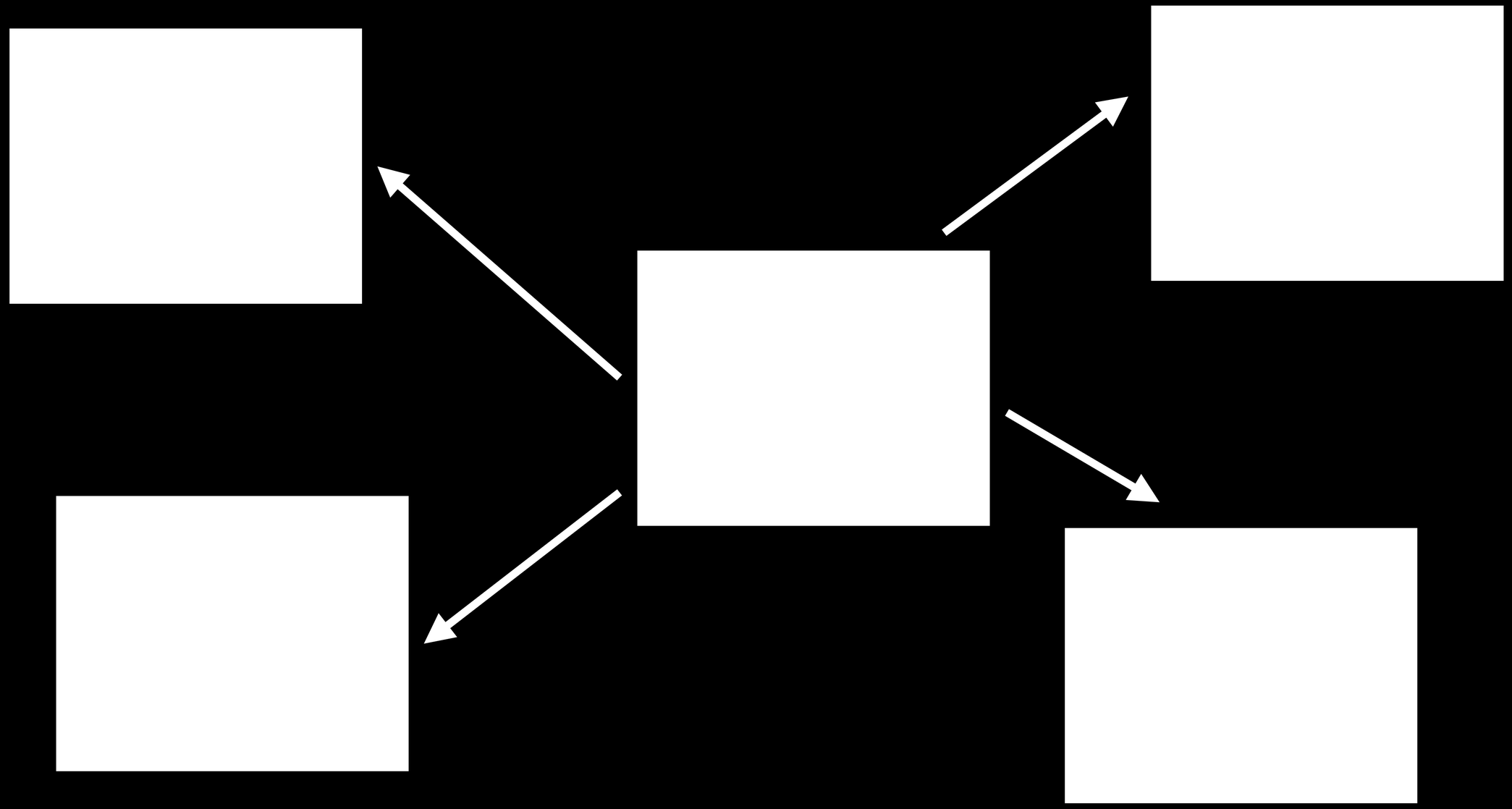
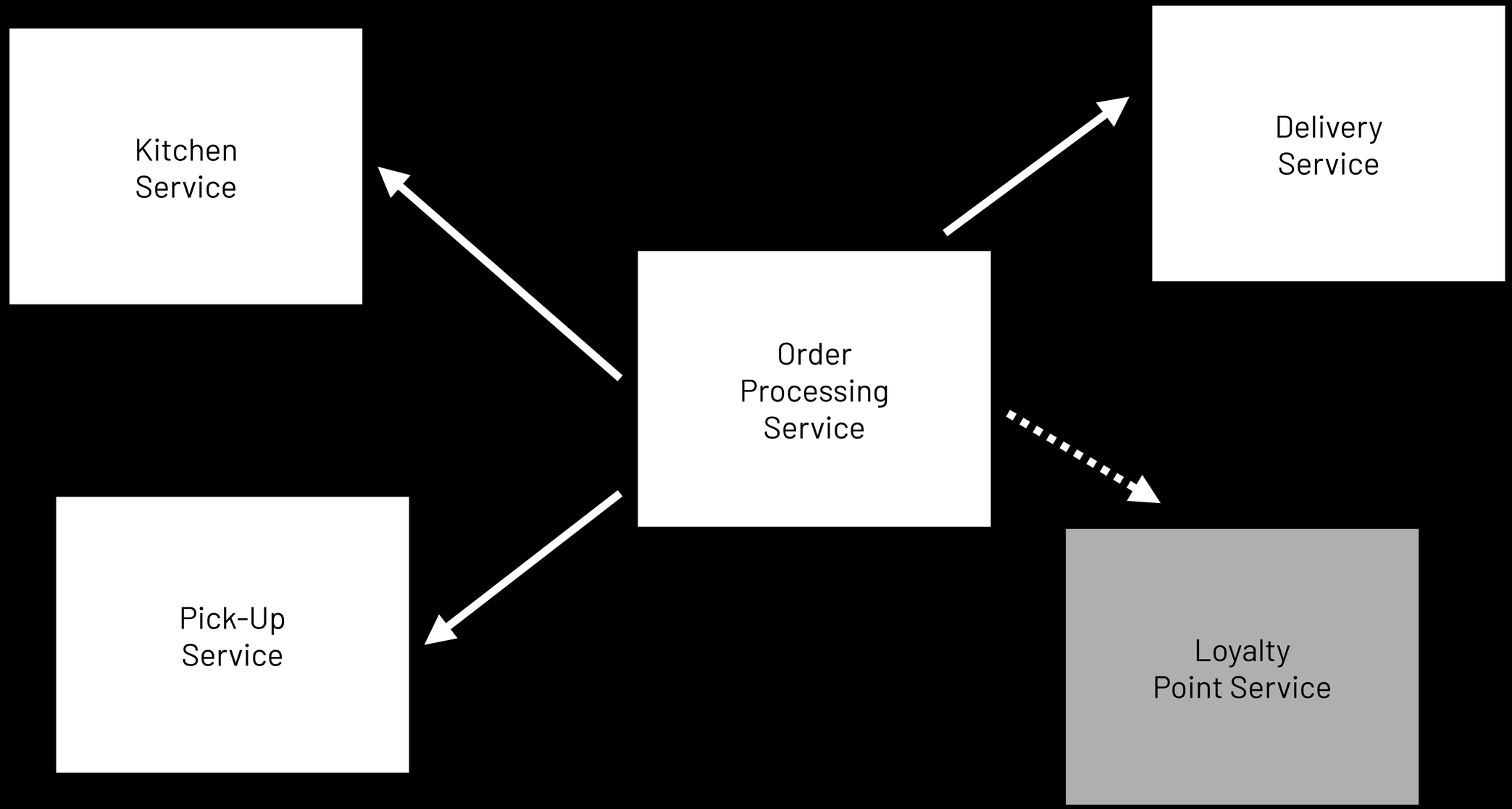
“EDA is fundamentally a communication pattern, a way of modelling the integration between systems.”

James Eastham

James Eastham
Serverless Advocate



“You learn much more in failure,
than you do in success”


Kitchen Service
Delivery Service
Order Processing Service
Pick-Up Service
Loyalty Point Service

“Aim for low coupling and
high cohesion”

Technology

Data format

Location

Data type

Temporal

Semantic

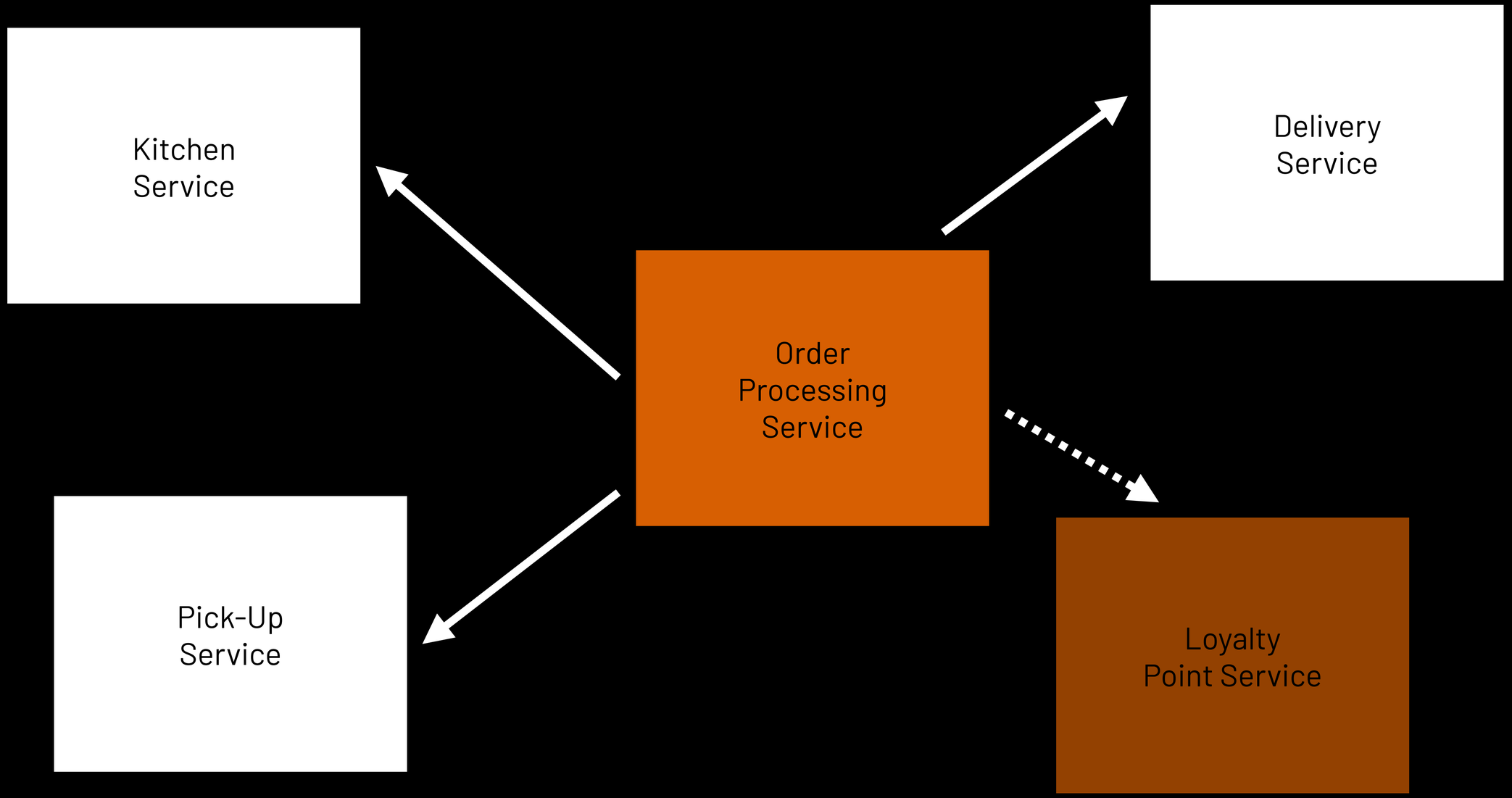
Interaction Style

“The appropriate level of coupling depends on the level of control you have over the endpoints”

Gregor Hohpe, Enterprise Integration Patterns

Why

Be Event Driven?


Kitchen Service
Delivery Service
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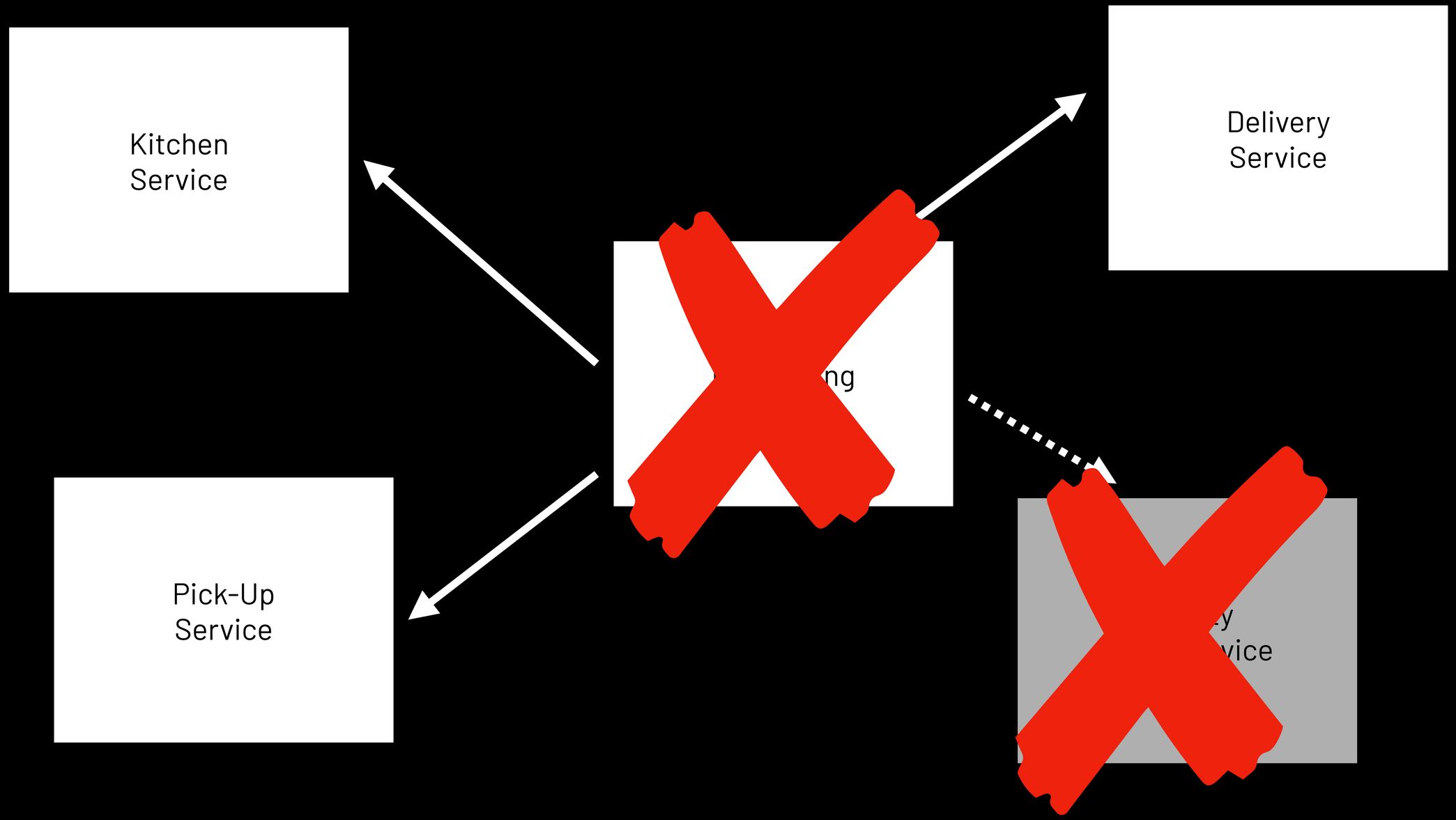
Pick-Up Service
Loyalty Point Service



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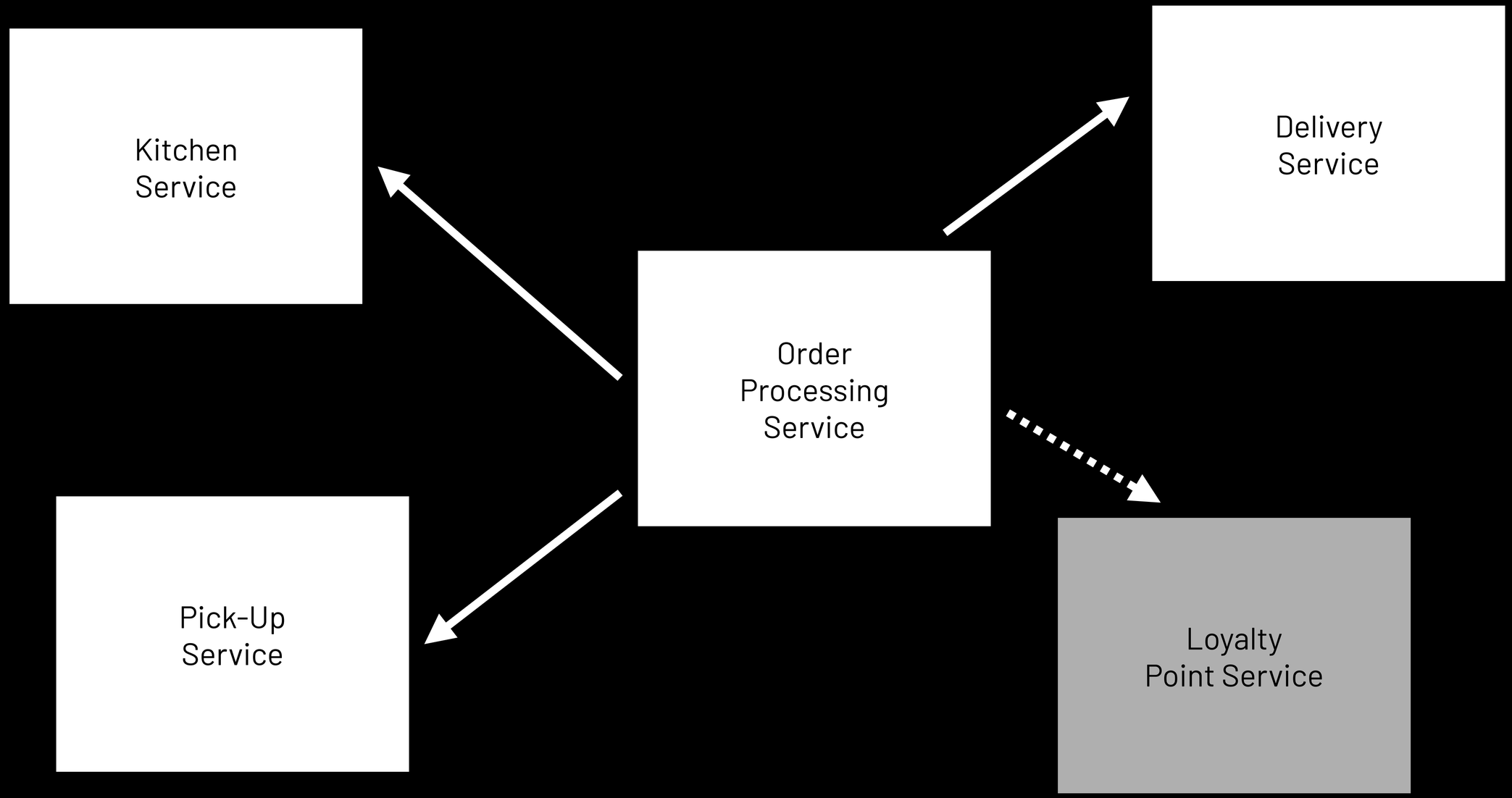
Kitchen Service
Delivery Service
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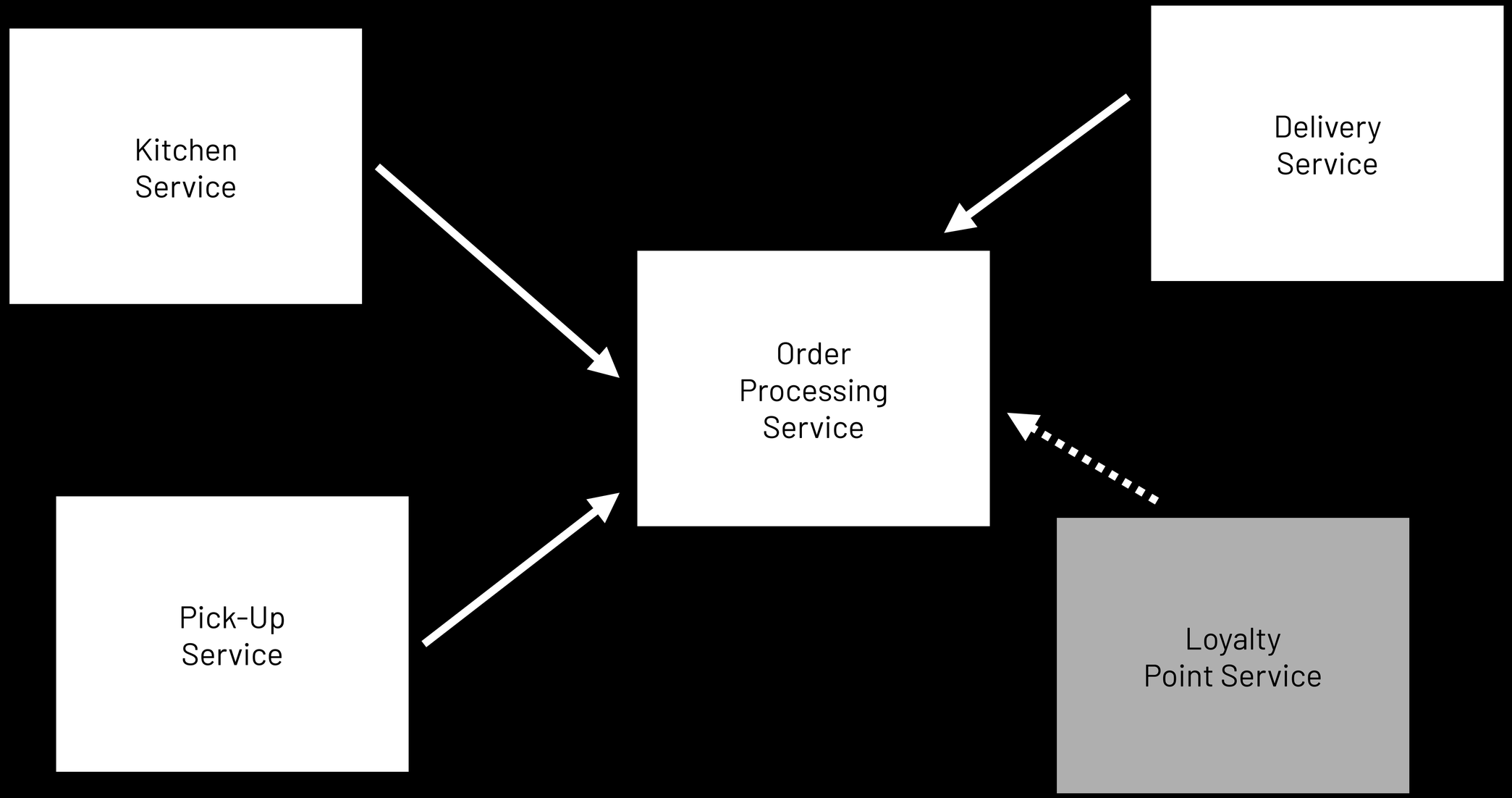
Loyalty Point Service

What

Does it mean to be event driven?


Kitchen Service
Delivery Service
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What is an event?

"An event is an immutable fact, something that has happened in the past and cannot be changed"

What does it mean to be ‘event-driven’?

“An event driven system triggers business functionality from business events”.

Delivery Notification Sent

Order Boxed

Order Confirmed

Staff Member Clocked In

“An event driven architecture lets you tell the story of your business, through it’s technical implementation”

James Eastham

Events

Are First Class Citizens

Events

Are First Class Citizens

?

Event First Design

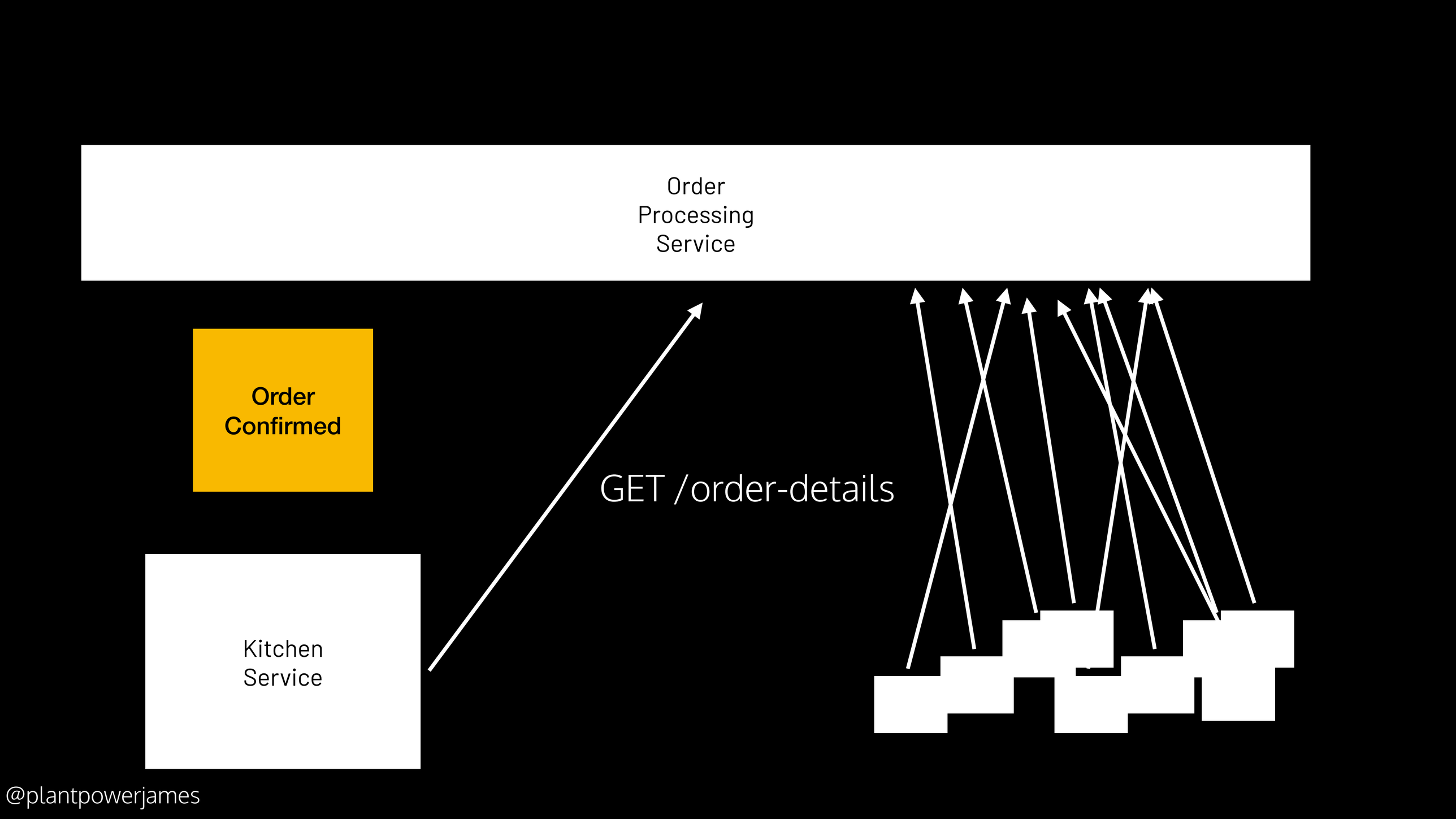
Types of Events

"A **Notification Event** is a simple, small package of data that notifies another system something has happened"

Order
Processing
Service

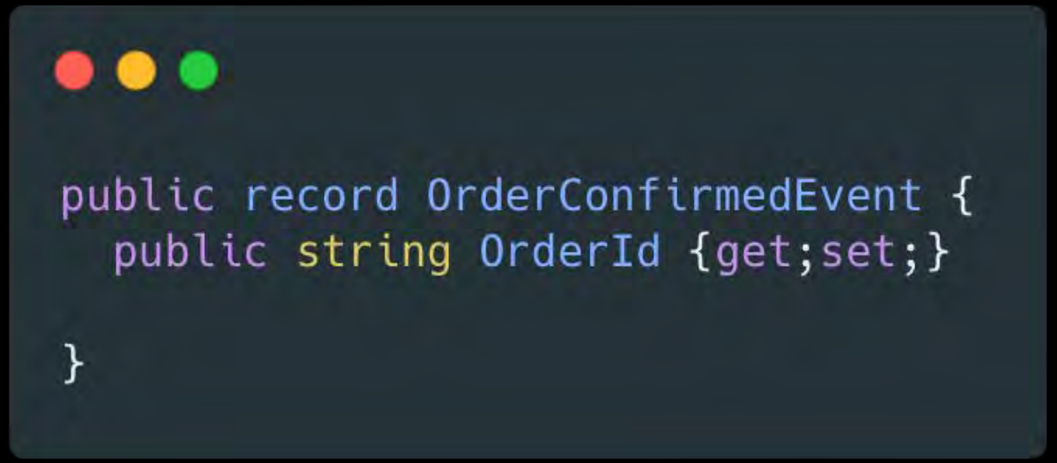
**Order
Confirmed**

Kitchen
Service

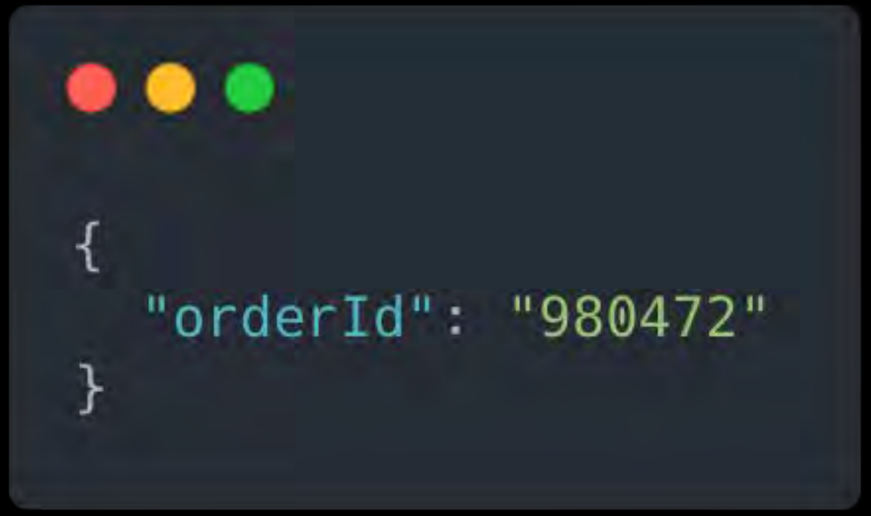

Order
Processing
Service
Order
Confirmed
GET /order-details
Kitchen
Service

“Services are unaware of the downstream consumers of their events”

Event Carried State Transfer



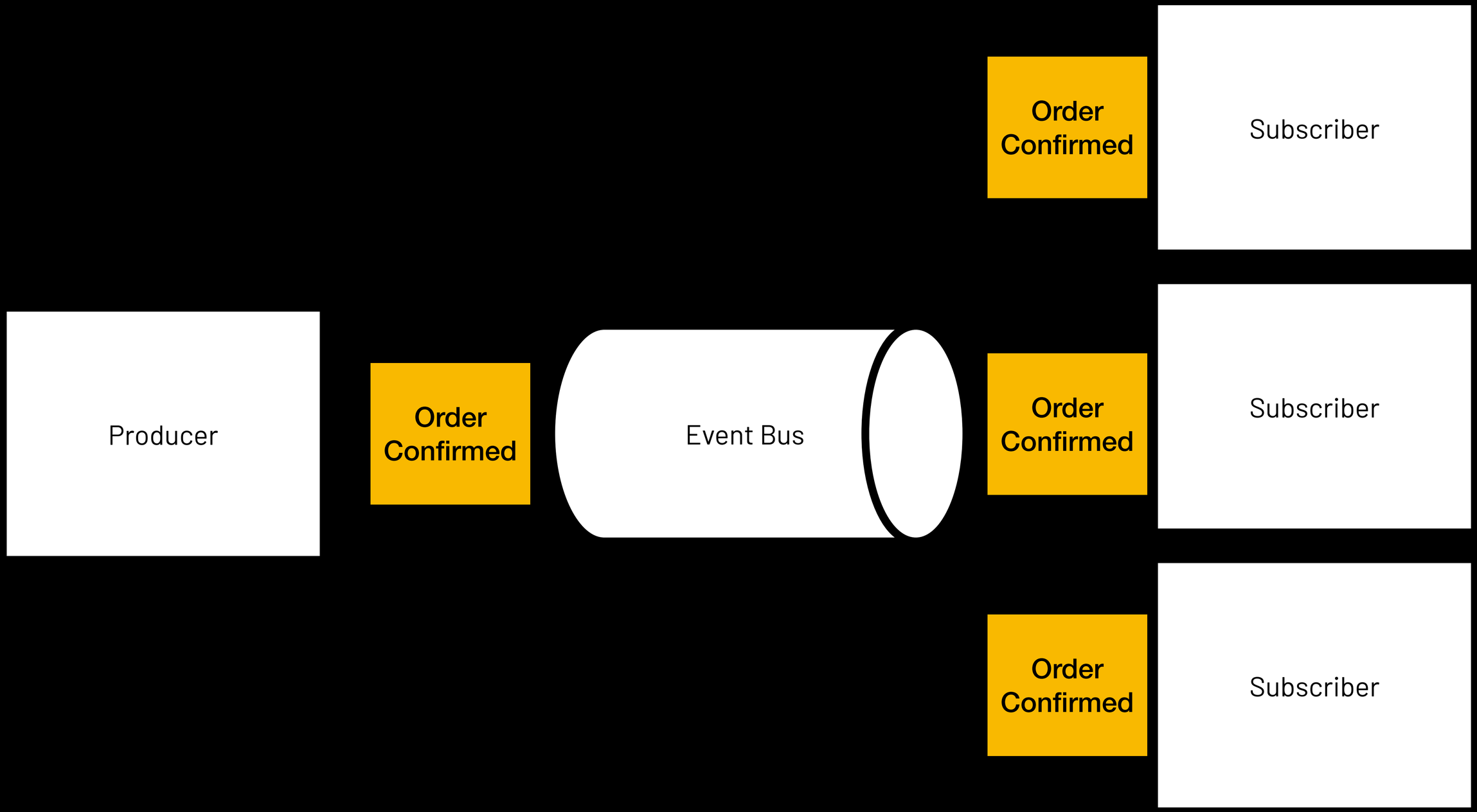
```
public record OrderConfirmedEvent {
  public string OrderId {get;set;}

}
```

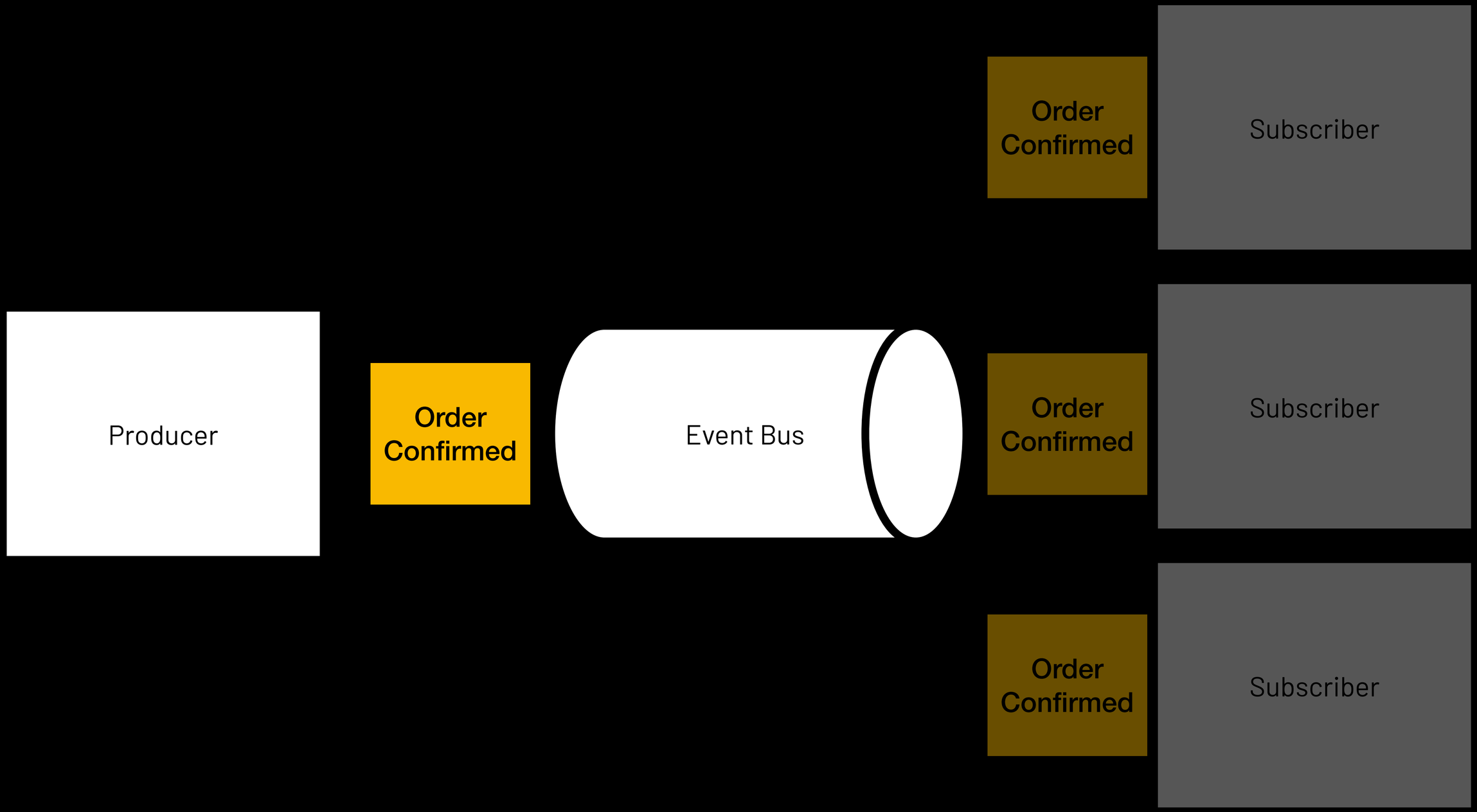

{
"orderId": "980472"
}

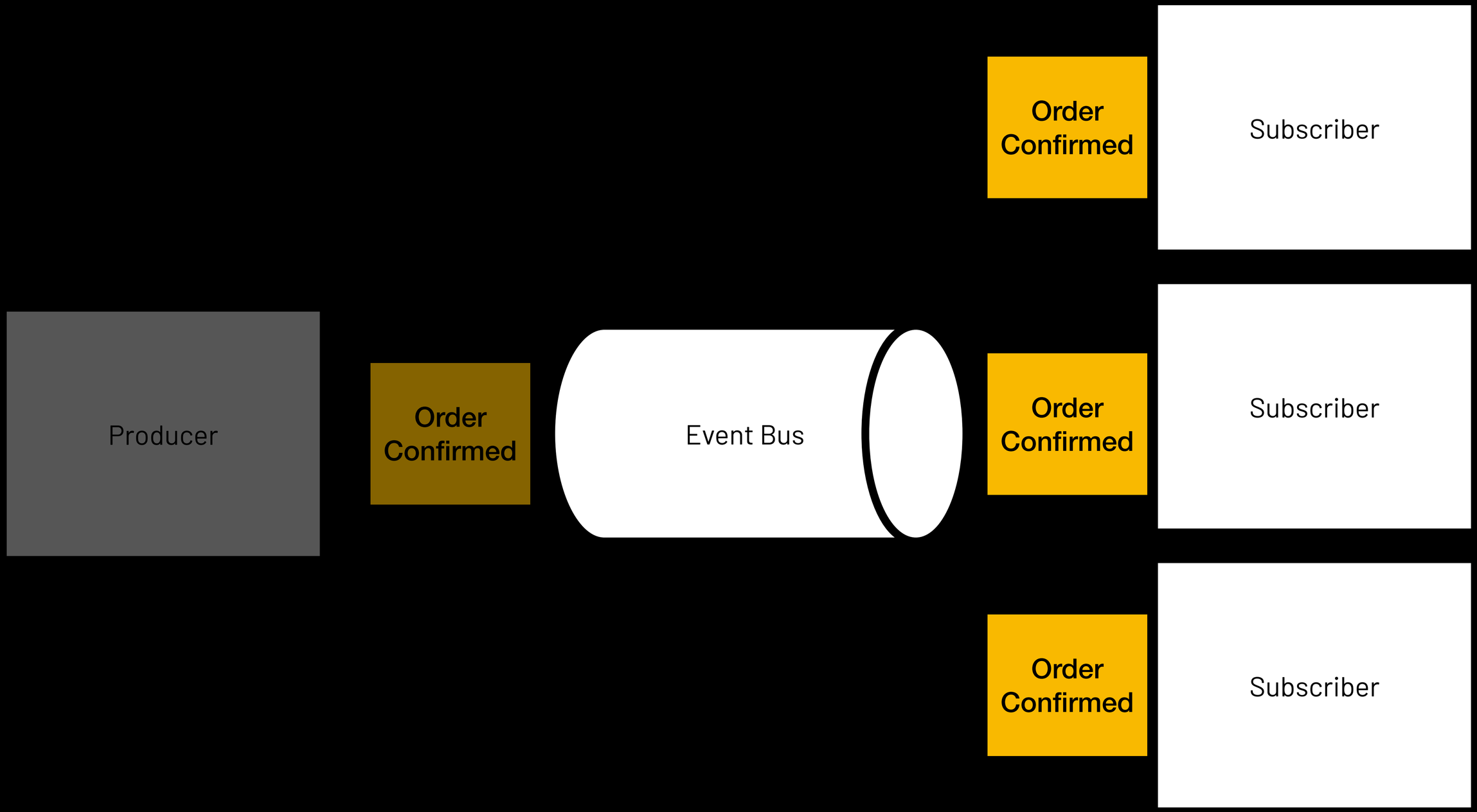
?

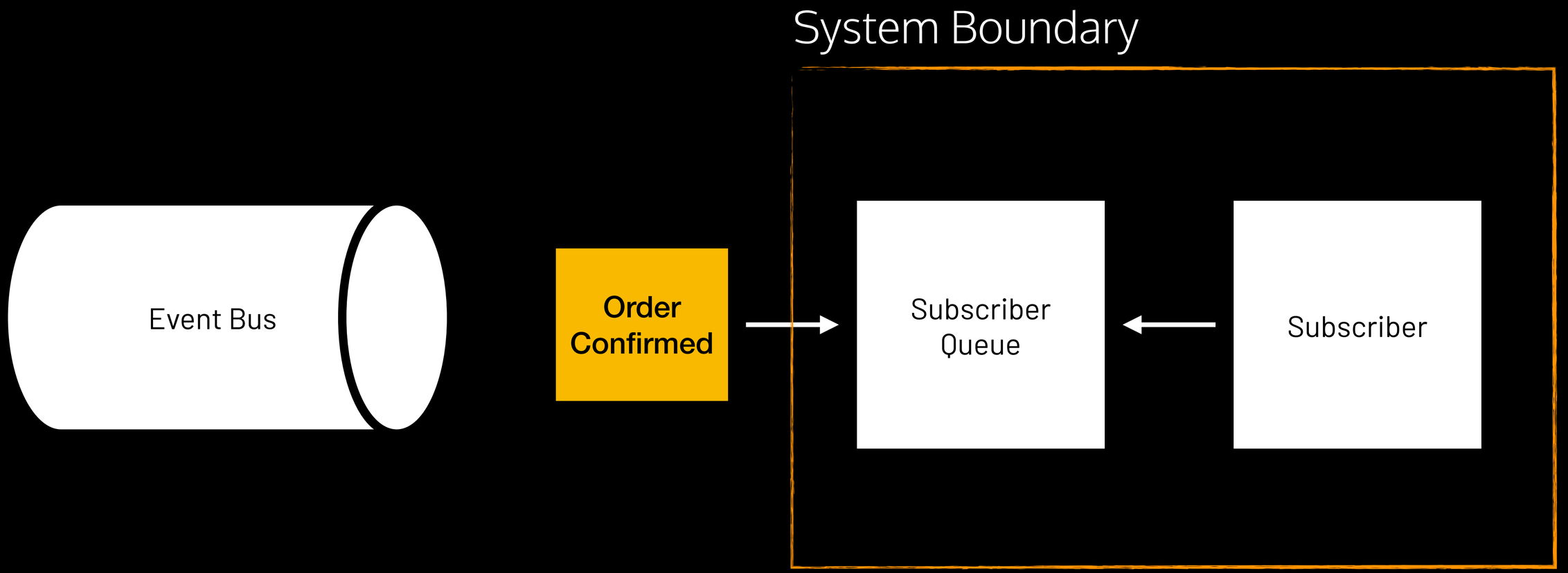
{
"orderId": "980472",
"orderNumber": "ORD676",
"orderValue": 19.89,
"deliveryAddress": {
"addressLine1": "167 My Street"
},
"items": [
{
"itemName": "Margherita",
"quantity": "all of them"
}
]
}

Producer
Event Bus
Consumer


Producer
Order Confirmed
Event Bus
Order Confirmed
Subscriber
Order Confirmed
Subscriber
Order Confirmed
Subscriber


Producer
Order Confirmed
Event Bus
Order Confirmed
Subscriber
Order Confirmed
Subscriber
Order Confirmed
Subscriber


Producer
Order Confirmed
Event Bus
Order Confirmed
Subscriber
Order Confirmed
Subscriber
Order Confirmed
Subscriber


System Boundary
Event Bus
Order Confirmed
Subscriber Queue
Subscriber

“EDA is fundamentally a communication pattern, a way of modelling the integration between systems.”

James Eastham

Evolvability

A Core Feature of Event Driven Architecture

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{
"orderId": "980472",
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"orderValue": 19.89,
"deliveryAddress": {
"addressLine1": "167 My Street"
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{
"itemName": "Margherita",
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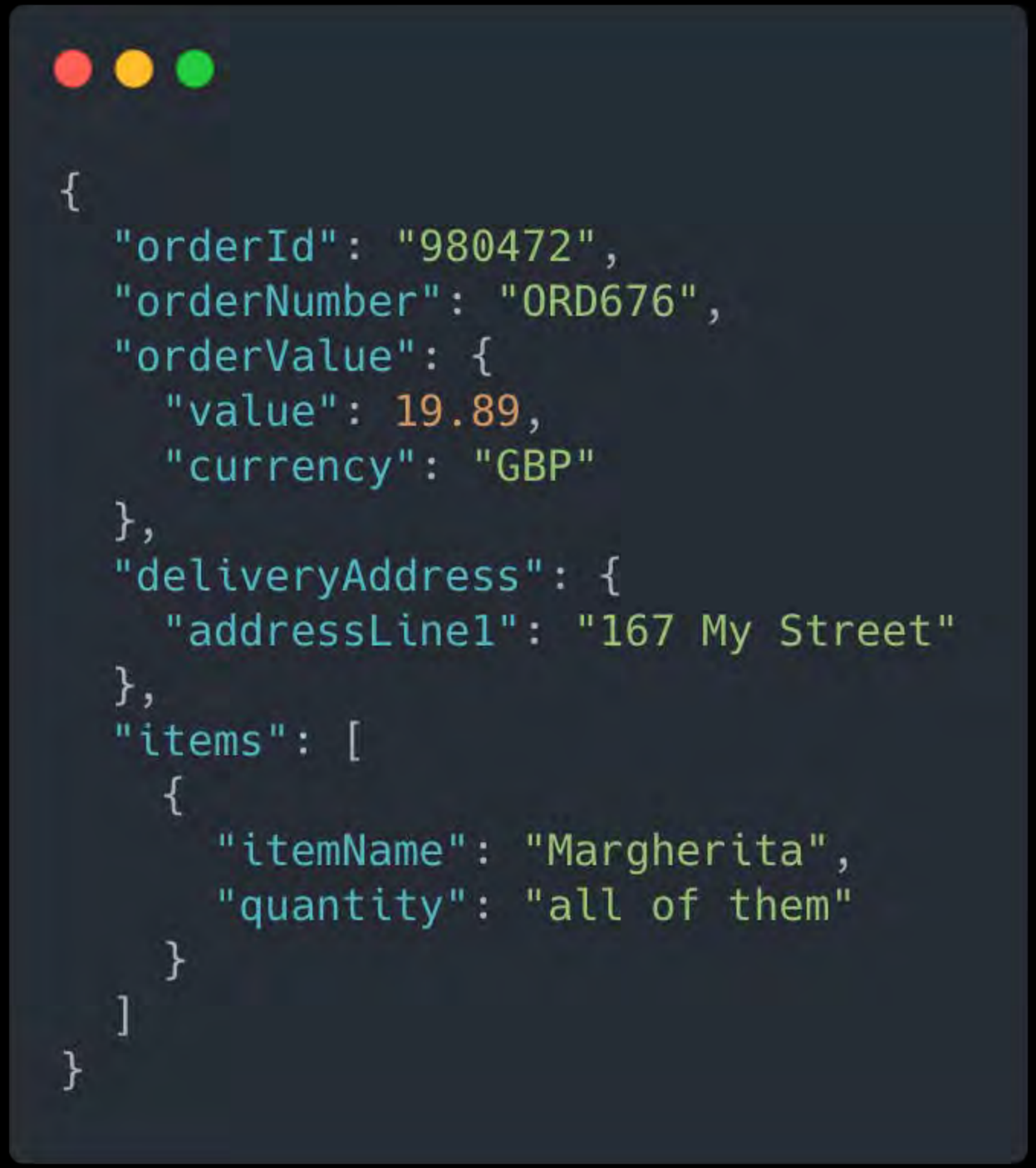
]
}



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Now What?

Governance

Request for Comments

43 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

For the Wikipedia process, see Wikipedia:Requests for comment.

A **Request for Comments** (**RFC**) is a publication in a series from the principal technical development and standards-setting bodies for the Internet, most prominently the Internet Engineering Task Force (IETF).[1][2] An RFC is authored by individuals or groups of engineers and computer scientists in the form of a memorandum describing methods, behaviors, research, or innovations applicable to the working of the Internet and Internet-connected systems. It is submitted either for peer review or to convey new concepts, information, or, occasionally, engineering humor.[3]

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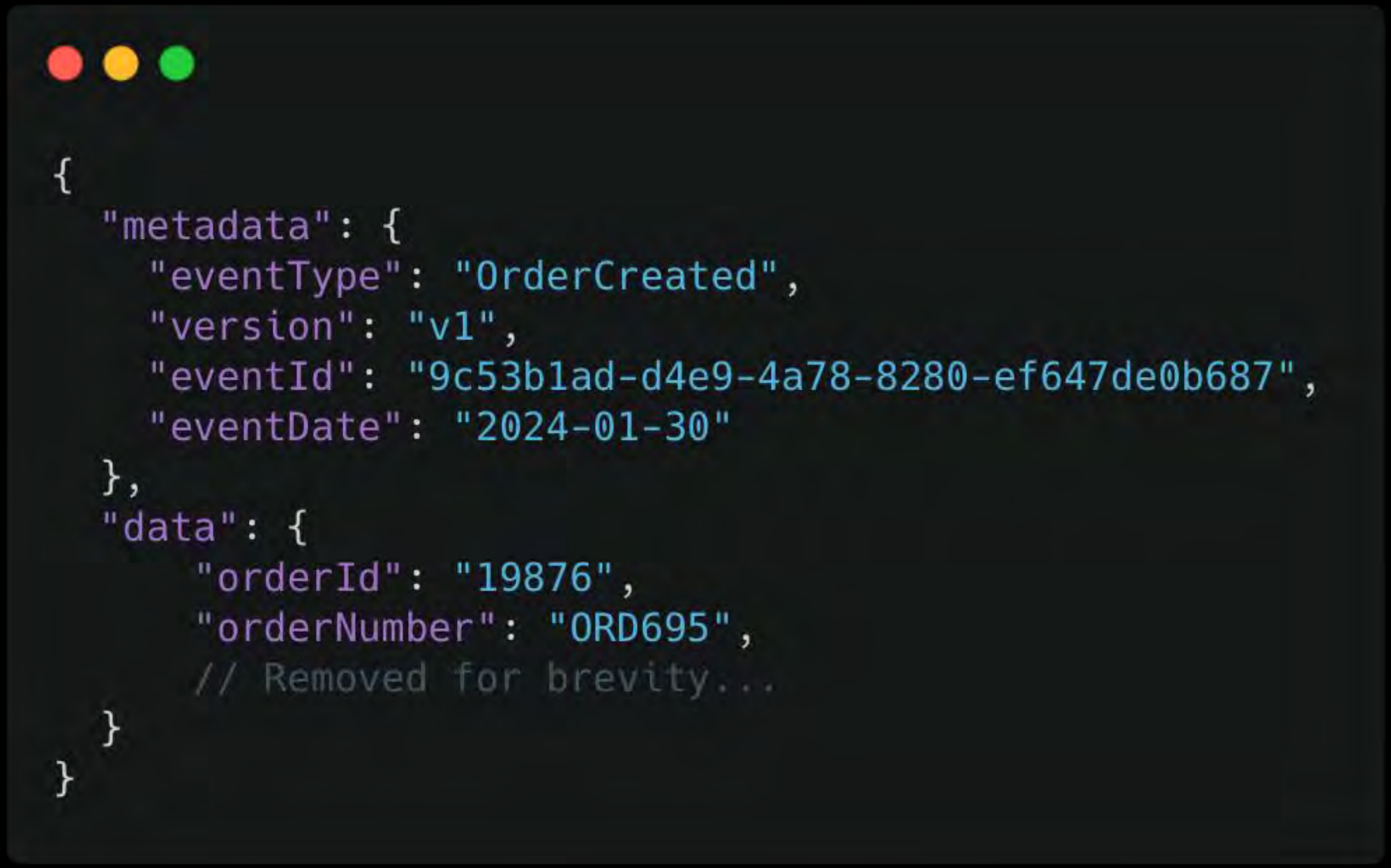
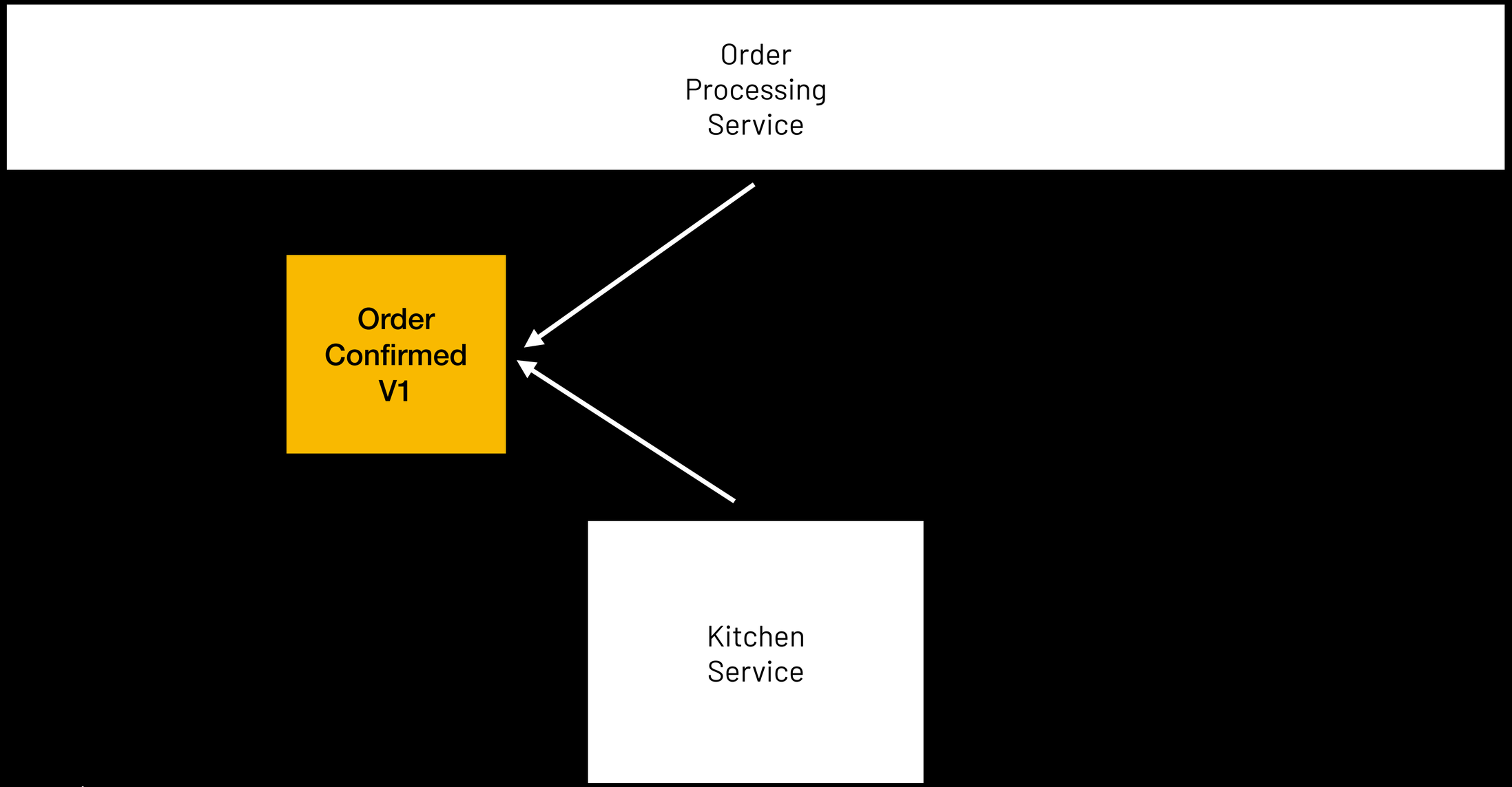
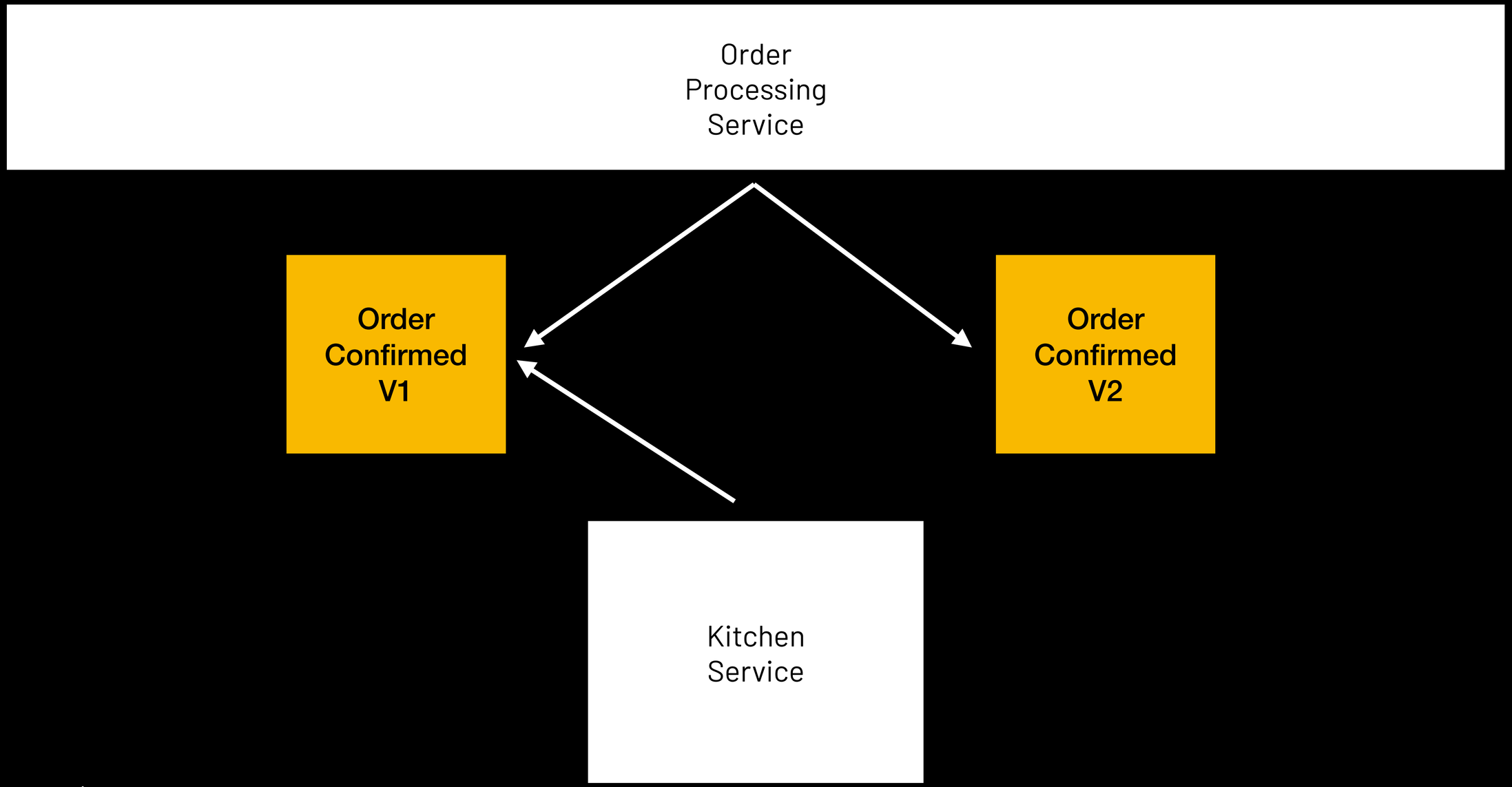
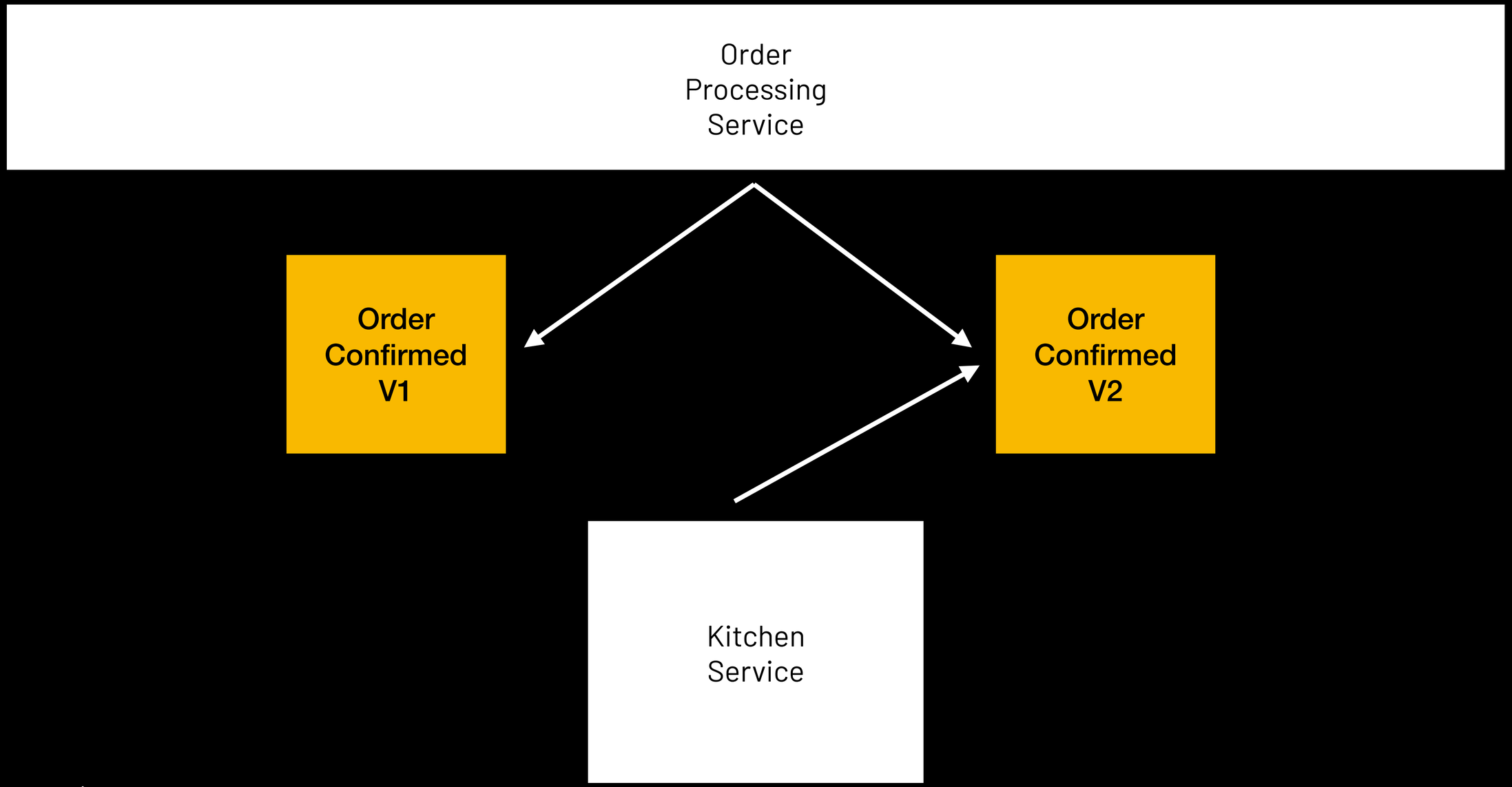

{
"metadata": {
"eventType": "OrderCreated",
"version": "v1",
"eventId": "9c53b1ad-d4e9-4a78-8280-ef647de0b687",
"eventDate": "2024-01-30"
},
"data": {
"orderId": "19876",
"orderNumber": "ORD695",
// Removed for brevity...
}
}

{
"specversion" : "1.0",
"type" : "com.github.pull_request.opened",
"source" : "https://github.com/cloudevents/spec/pull",
"subject" : "123",
"id" : "A234-1234-1234",
"time" : "2018-04-05T17:31:00Z",
"comexampleextension1" : "value",
"comexampleothervalue" : 5,
"datacontenttype" : "text/xml",
"data" : "<much wow=\"xml\"/>"
}


Order
Processing
Service
Order
Confirmed
V1
Kitchen
Service

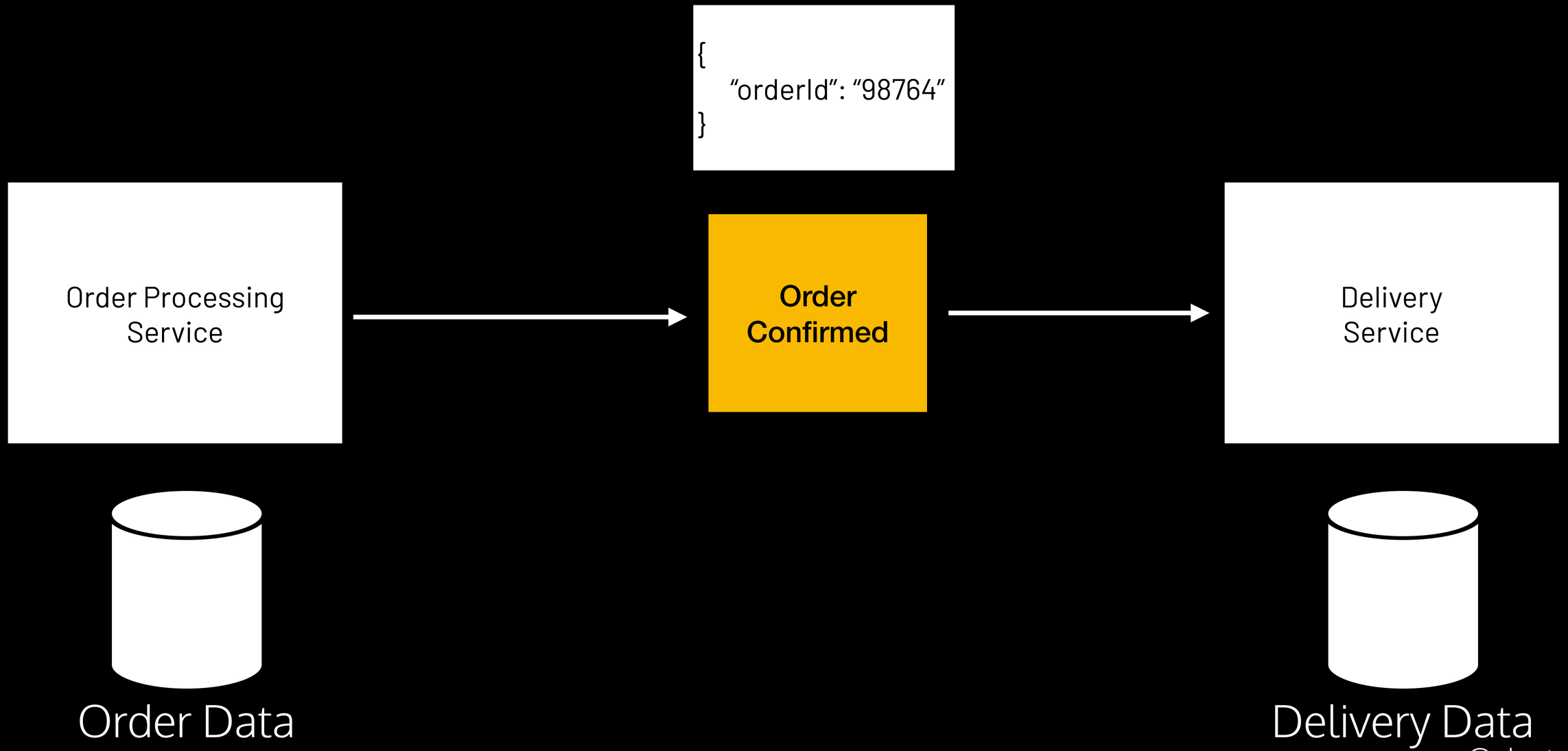

Order
Processing
Service
Order
Confirmed
V1
Order
Confirmed
V2
Kitchen
Service


Order
Processing
Service
Order
Confirmed
V1
Order
Confirmed
V2
Kitchen
Service

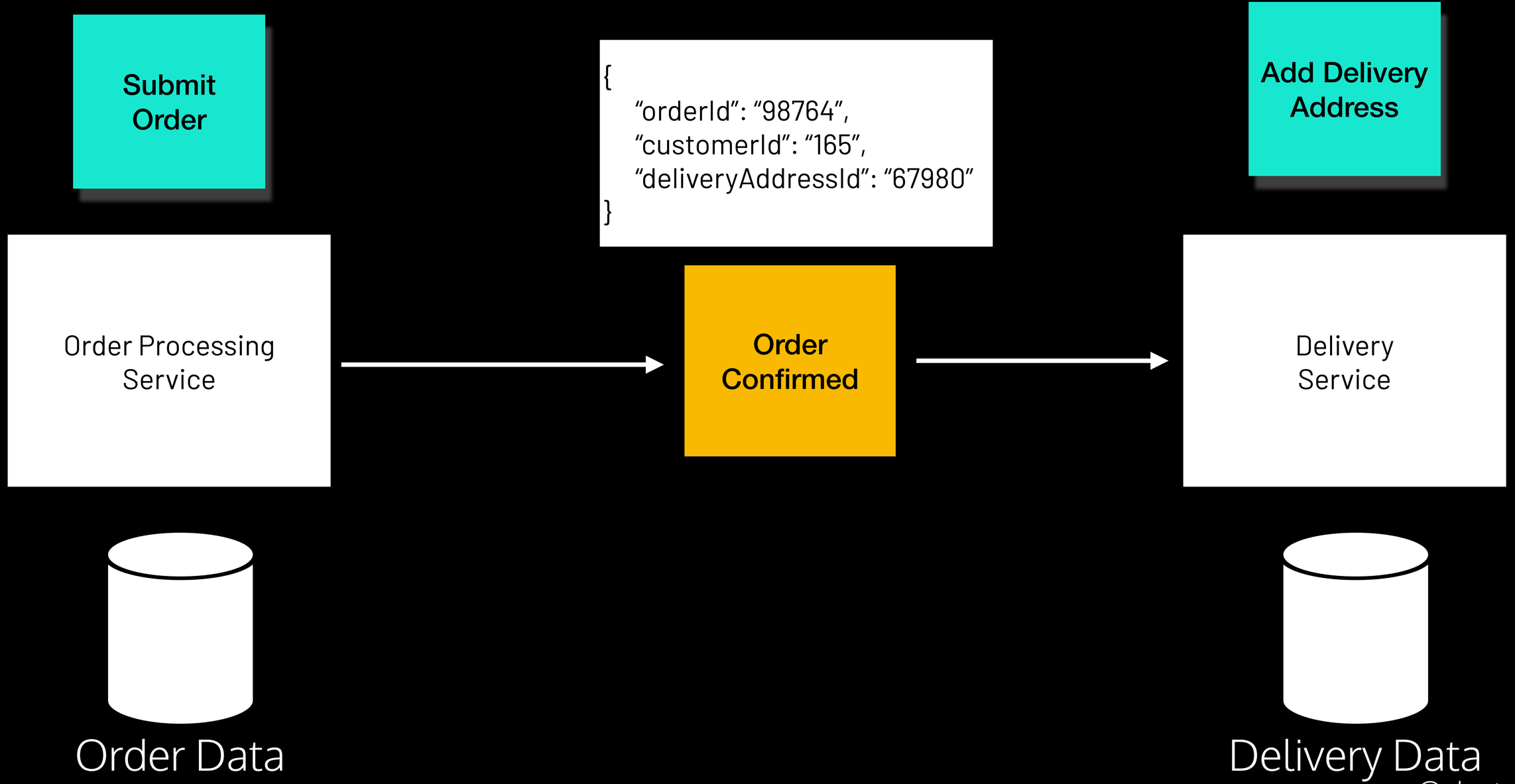
So, fat vs sparse events?

Long Live the Sparse Event

Long Live Sparse Events



Long Live Sparse Events



Embrace the Metadata/Data Pattern

Asynchronous

What Happens When You Think Async?

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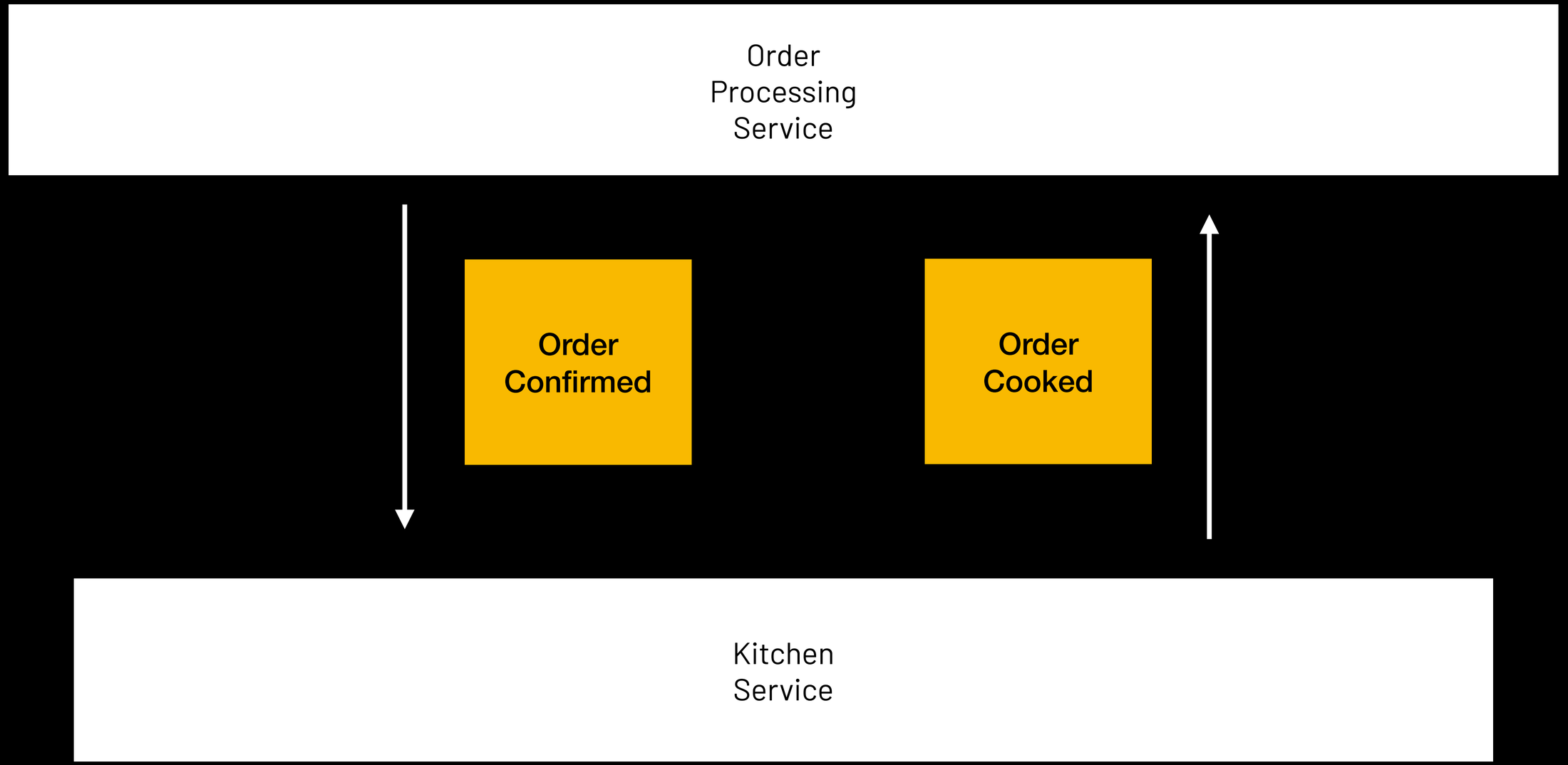
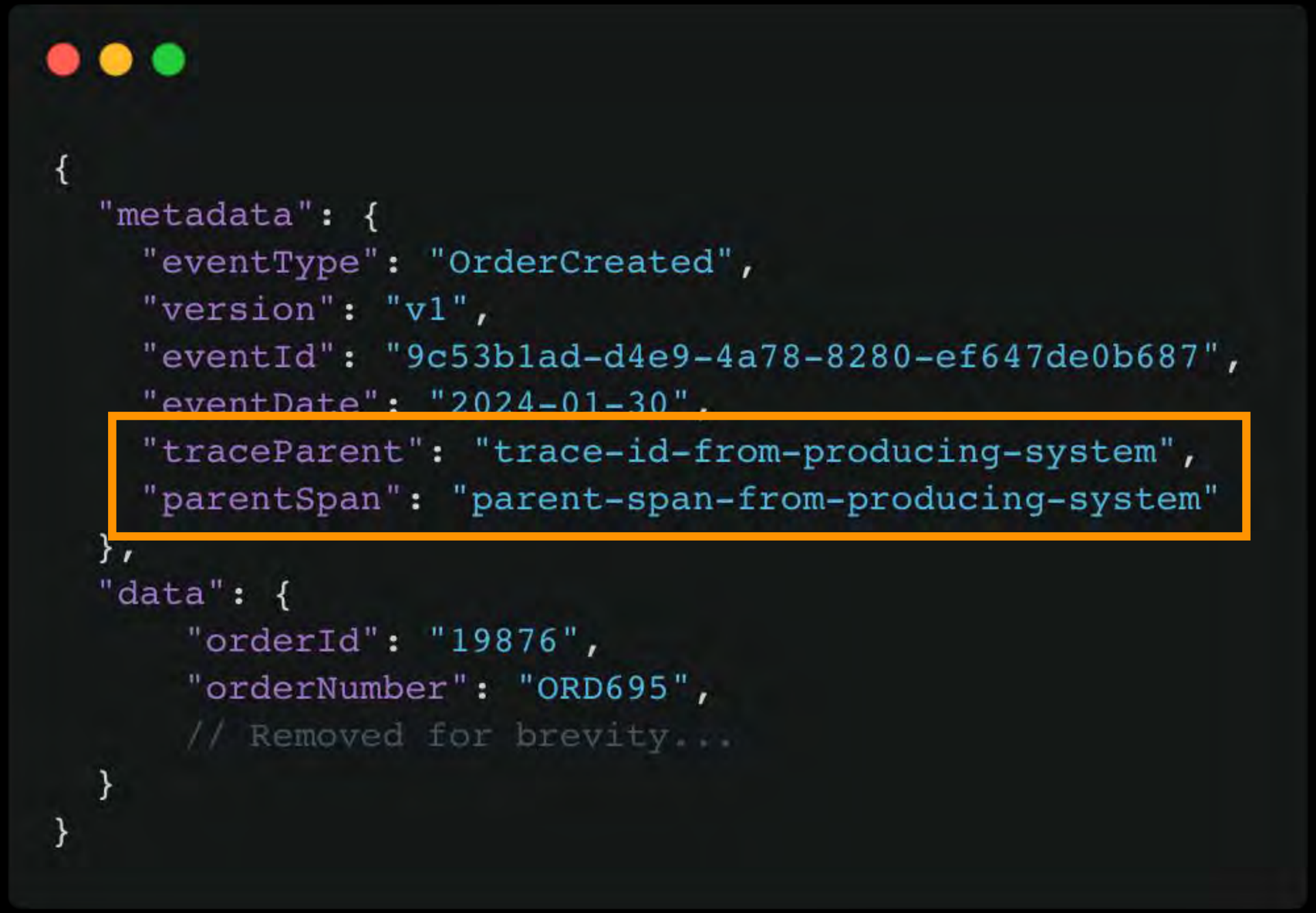

Order
Processing
Service
Order
Confirmed
Order
Cooked
Kitchen
Service

Embrace Eventual Consistency

Observability

What Happens When Things Break?


{
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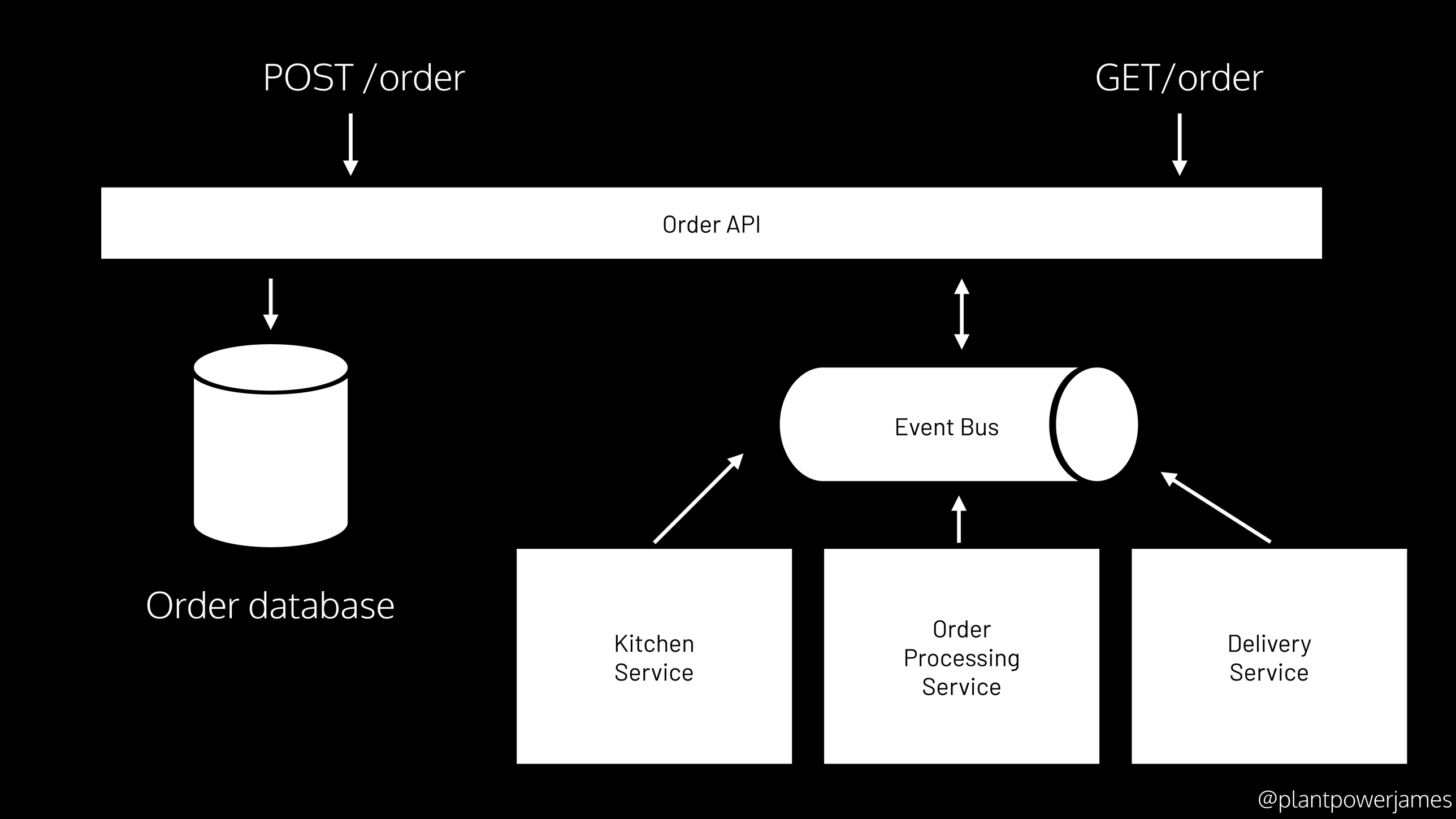
"eventType": "OrderCreated",
"version": "v1",
"eventId": "9c53b1ad-d4e9-4a78-8280-ef647de0b687",
"eventDate": "2024-01-30",
"traceParent": "trace-id-from-producing-system",
"parentSpan": "parent-span-from-producing-system"
},
"data": {
"orderId": "19876",
"orderNumber": "ORD695",
// Removed for brevity...
}
}

Boundaries

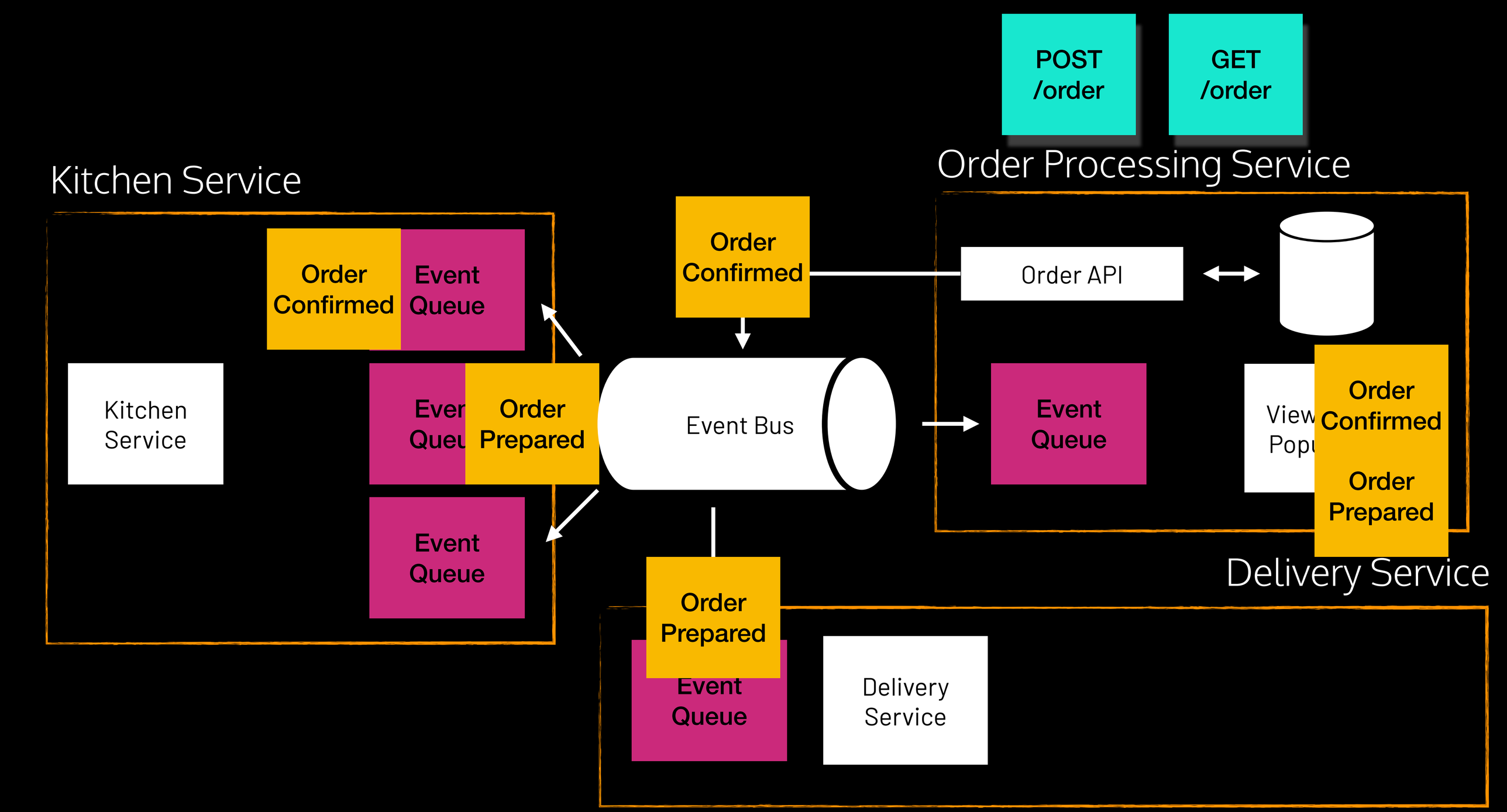
Surely You Need Synchronous Sometimes?


POST /order
GET/order
Order API
Order database
Event Bus
Kitchen Service
Order Processing Service
Delivery Service

Commands

Events

Queries



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Start Small

Add Messaging

“EDA is fundamentally a communication pattern, a way of modelling the integration between systems.”

James Eastham

Thank you for listening.

James Eastham
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YouTube: @serverlessjames
LinkedIn: james-eastham