INNOVATE

MODERN APPLICATIONS EDITION

27&28 October 2021

Building scalable, serverless event-driven architectures

Phong Le

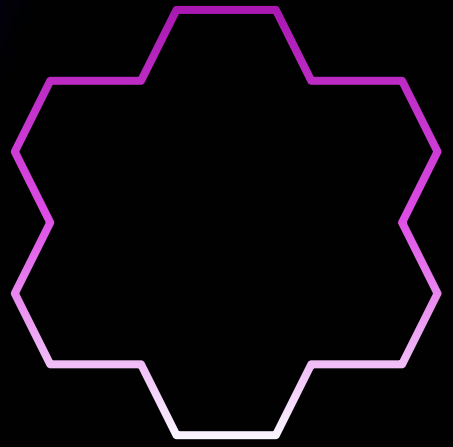
Solutions Architect
Amazon Web Services

Agenda

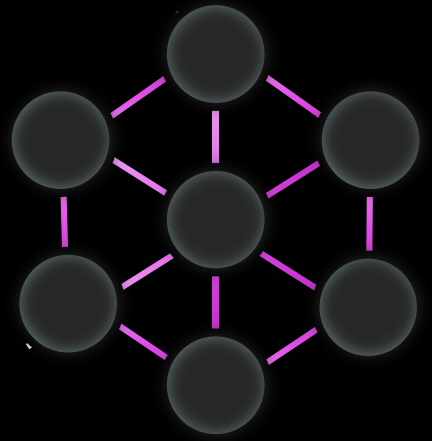
- Challenges with distributed systems
- Event-driven architecture overview
- AWS messaging and event services
- Demo

Challenges with distributed systems

Changes to architectural patterns

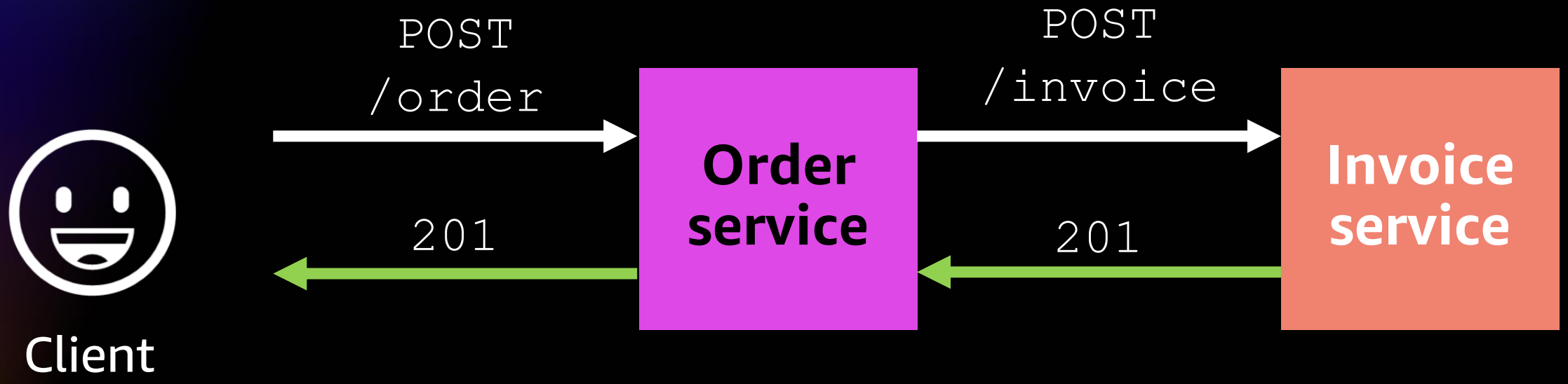


Monolith
Does everything

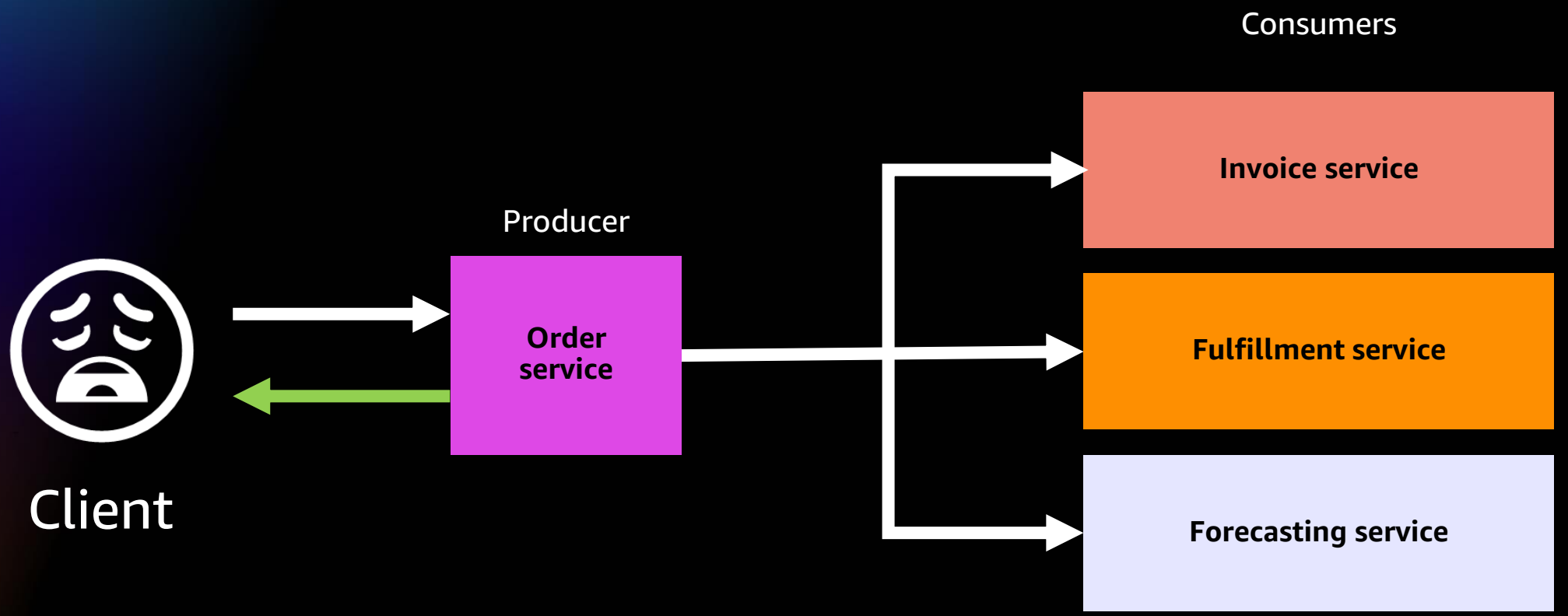


Microservices
Do one thing

Microservices start simple



Synchronous API challenges over time



Solution: Event-driven architectures

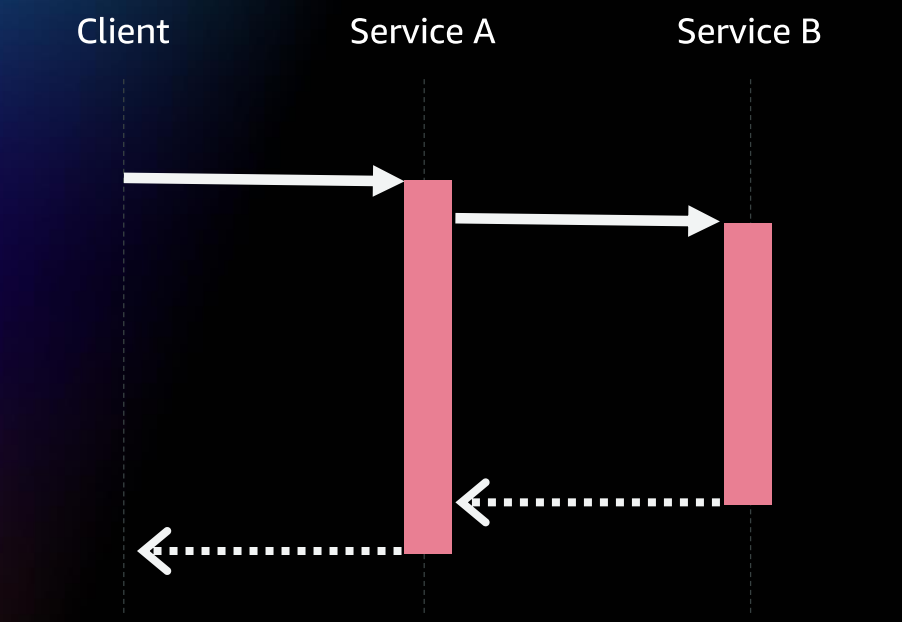
What are events?

- Events are a major mechanism for sharing information across services about the change in state
- Immutable - cannot change the past
- Events have semantic intent, represented as verbs in the past tense, e.g. “customer_created”
- Lightweight, correlated by properties that are common across bounded contexts “customer_id”

Events are also…

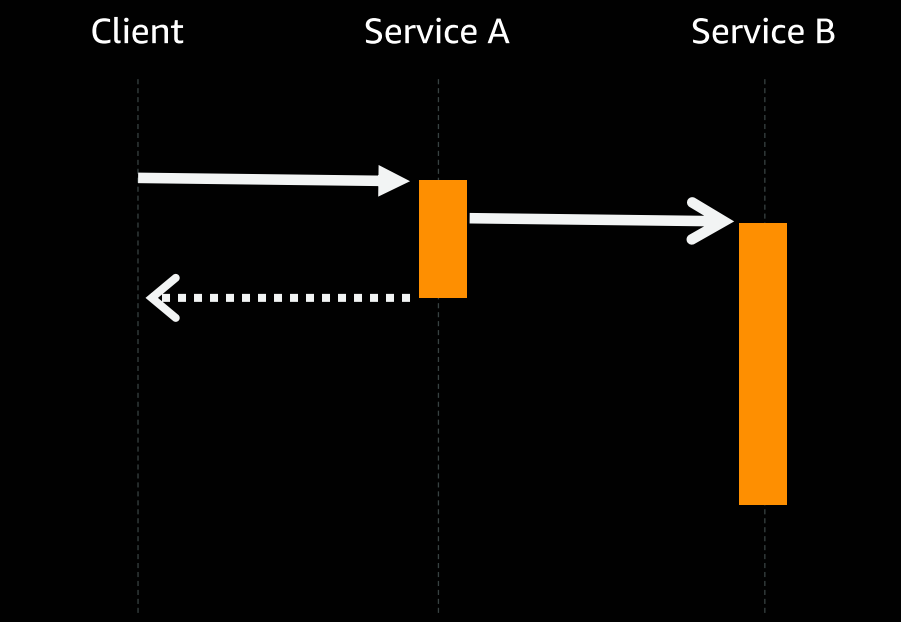

```
{
  "version": "0",
  "id": "f7a39f75-eff9-a823-5534-1075b196edd3",
  "detail-type": "EC2 Instance State-change Notification",
  "source": "aws.ec2",
  "account": "************",
  "time": "2018-08-21T20:55:26Z",
  "region": "us-east-1",
  "resources": [ ],
  "detail": {
    "instance-id": "i-00b414b880501ae45",
    "state": "running"
  }
}
```

Improve responsiveness and reduce dependencies



Synchronous

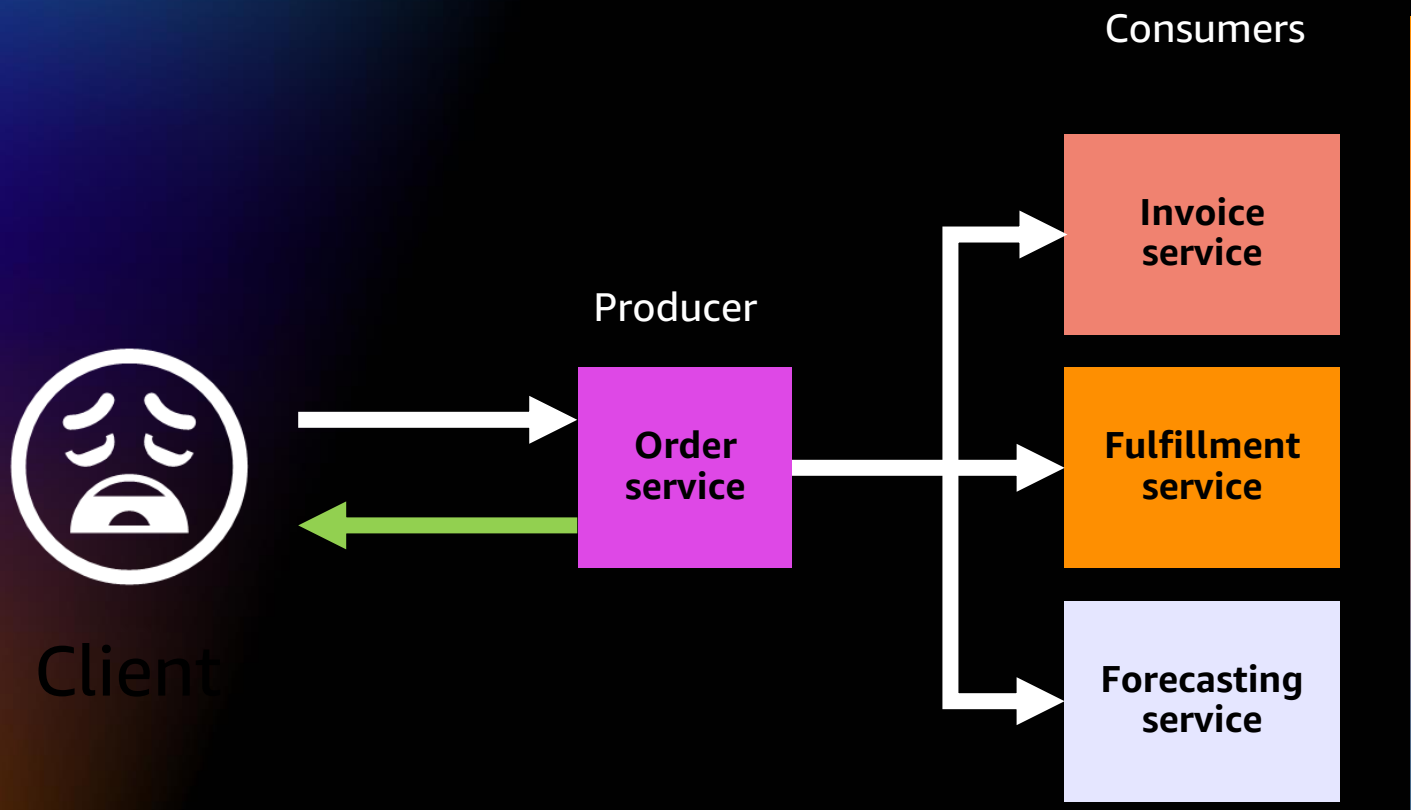
Commands



Asynchronous

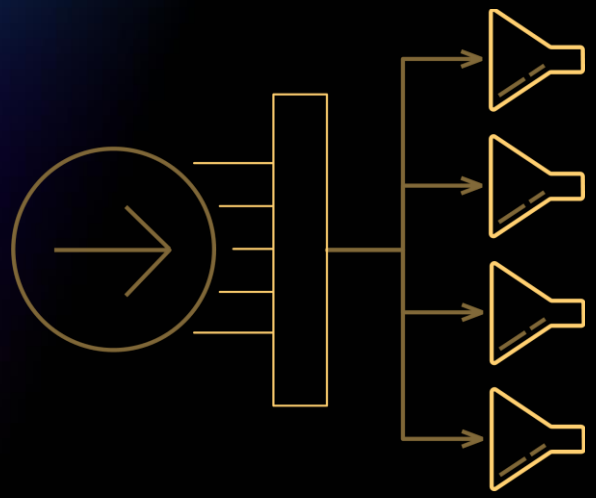
Events

Recap: Synchronous API challenges

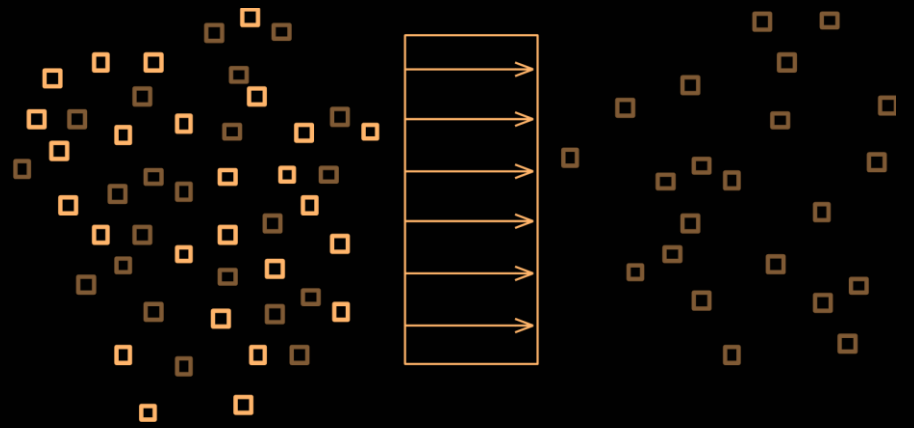


- Coupling between producers and consumers
- Multiple points of failure
- Varying degree of quality of service
- External dependencies

De-couple services with event routers

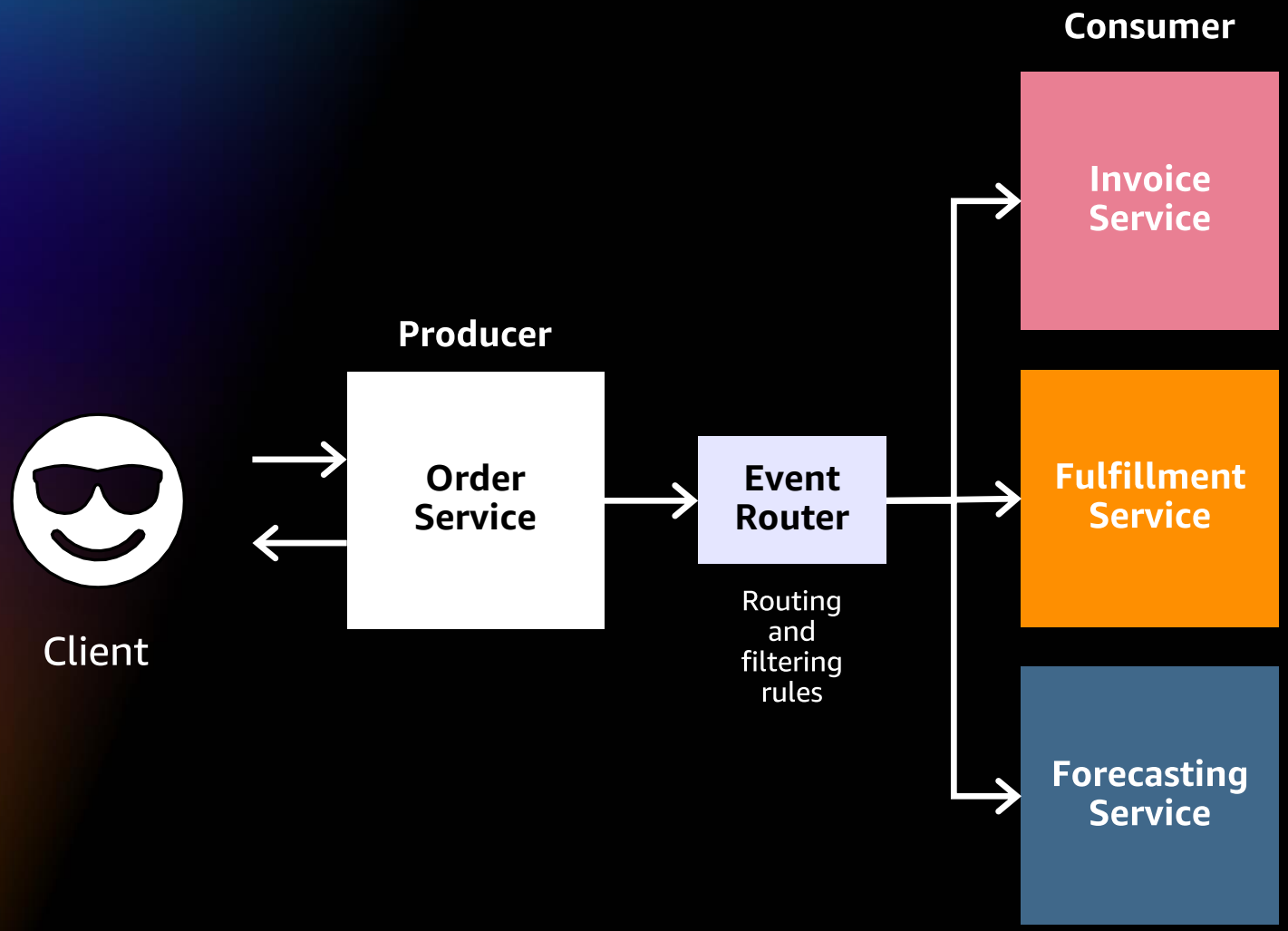


Abstracts producers and consumers



Selects and filters events

Challenges with distributed systems (synchronous API)



Loose coupling between producers and consumers

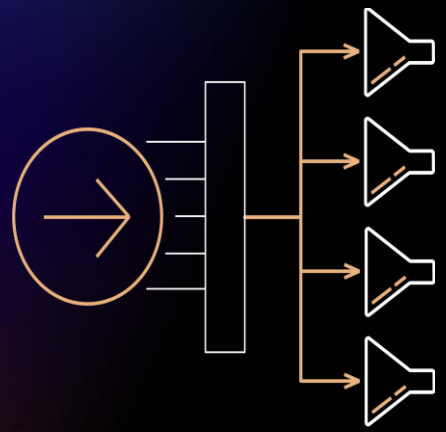
Isolated failure

Predicable quality of service

No external dependencies

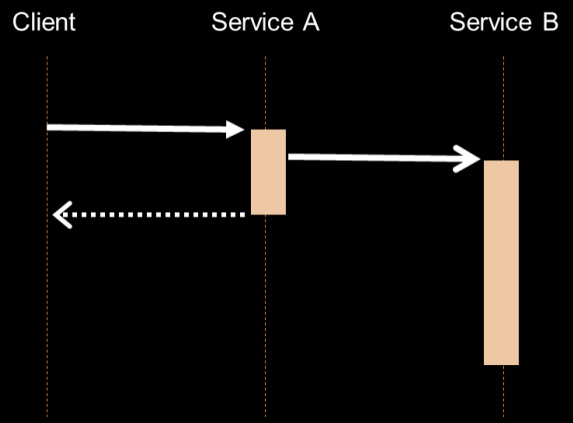
Event-driven architectures drive reliability and scalability

Event routers



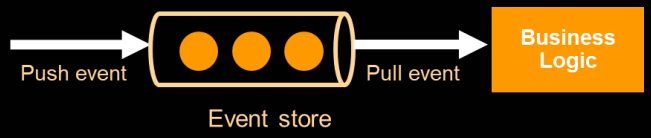
Abstract producers and consumers from each other

Asynchronous events



Improve responsiveness and reduce dependencies

Event stores



Buffer messages until services are available to process

AWS messaging and event services

Events enable interaction between services

Managed services provide routing, storage, and distribution of events

Amazon Simple Queue Service (Amazon SQS)

Messaging

Durable and scalable
Fully managed
Comprehensive security

Amazon Simple Notification Service (Amazon SNS)

Eventing

Performance at scale
Fully managed
Enterprise-ready

Amazon EventBridge

Choreography

Event filtering
Managed & scalable
SaaS integration

Amazon EventBridge

A serverless event bus service for AWS services,
your own applications, and SaaS providers

aws

Amazon EventBridge

WHAT IT IS

Simple, flexible, fully managed, pay as you go, event bus service that makes it easy to ingest and process data from AWS services, your own applications, and SaaS applications.

USE CASE

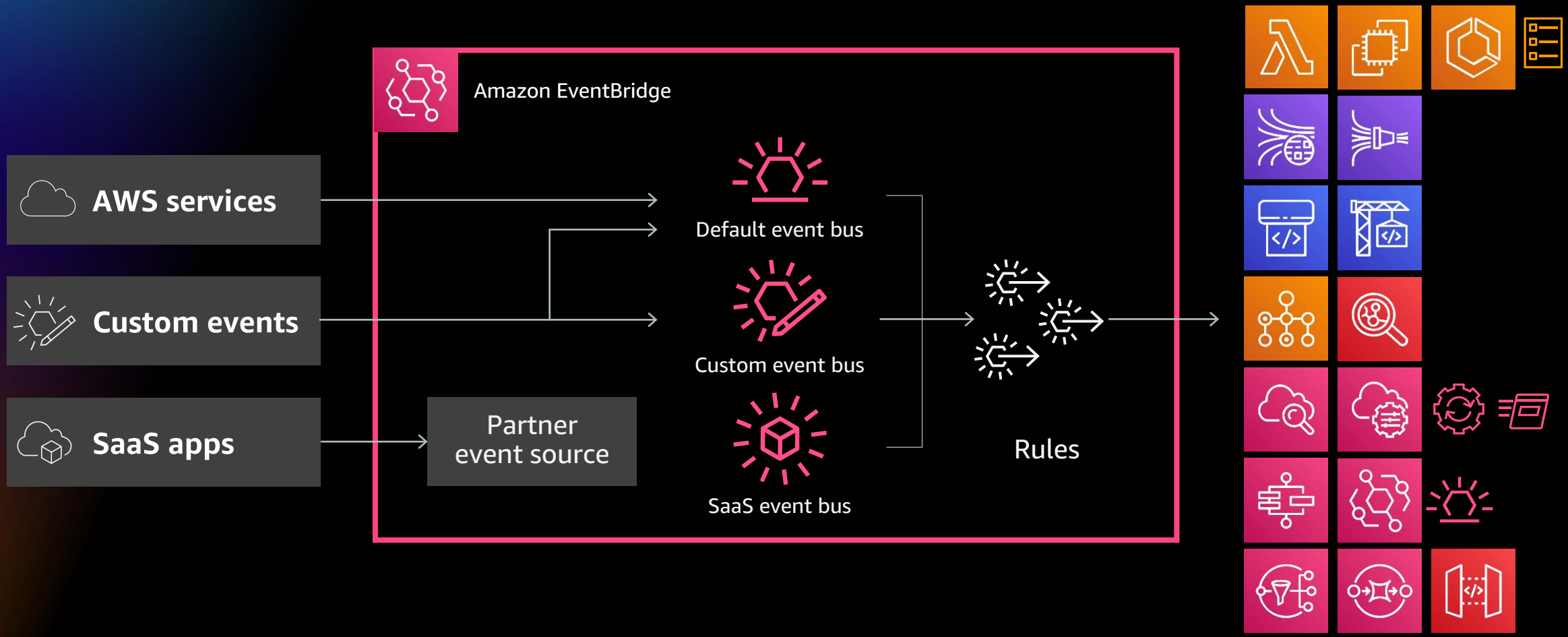
Remove friction of having to write point-to-point integrations between services. Take action on SaaS messages, run workflows, apply intelligence, audit and analyze, and synchronize data.

COOL CAPABILITIES

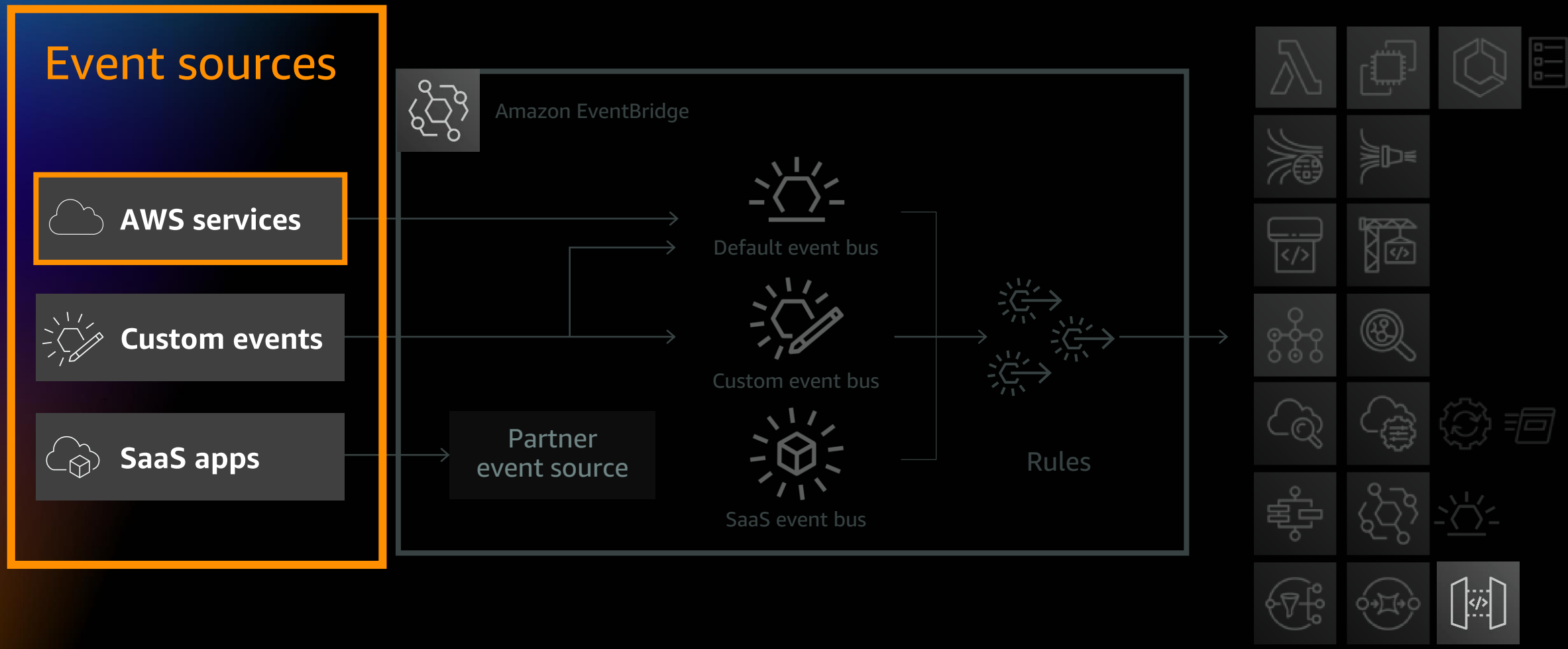
21 targets including AWS Lambda, Amazon SQS, Amazon SNS, Amazon Kinesis, and Amazon Kinesis Data Firehose

Schema Registry stores a collection of schemas a and allows developers to SEARCH/FIND/TRACK different schemas that are used for applications.

Amazon EventBridge architecture

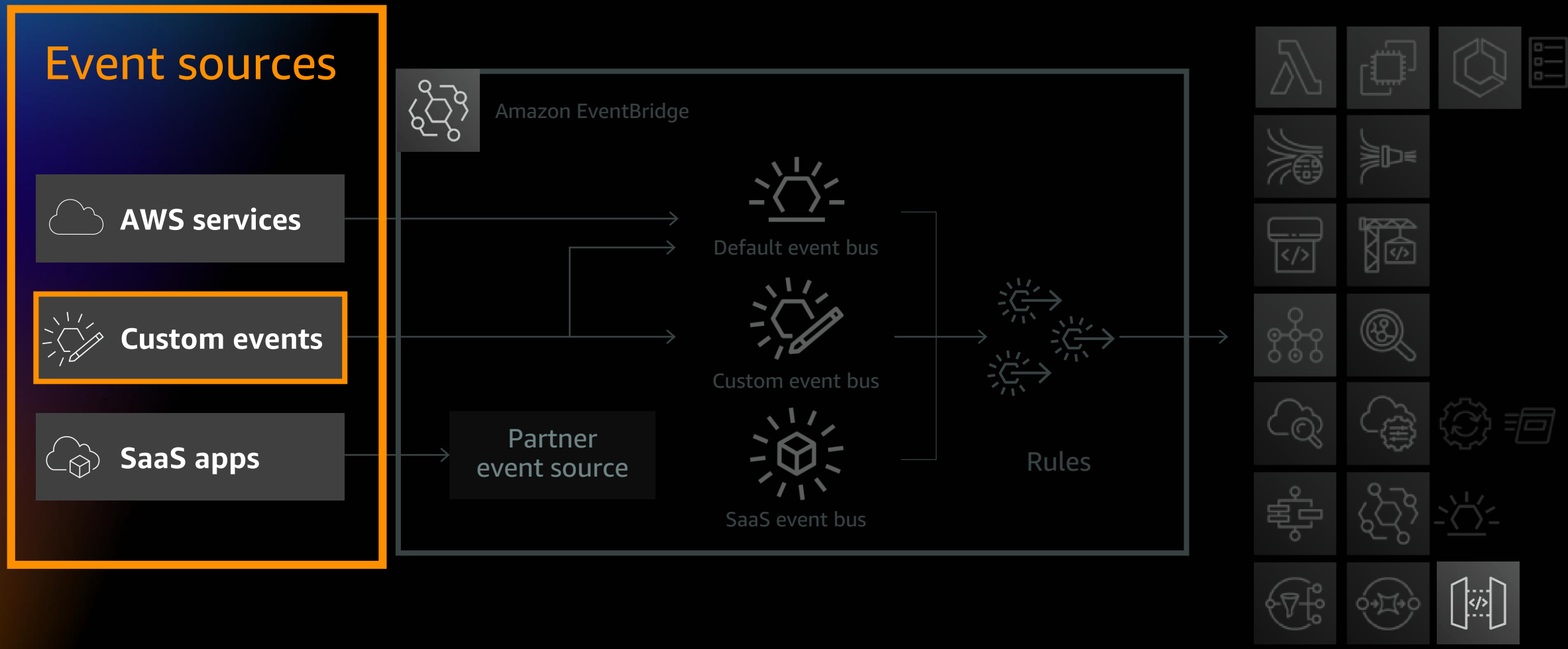


Amazon EventBridge architecture

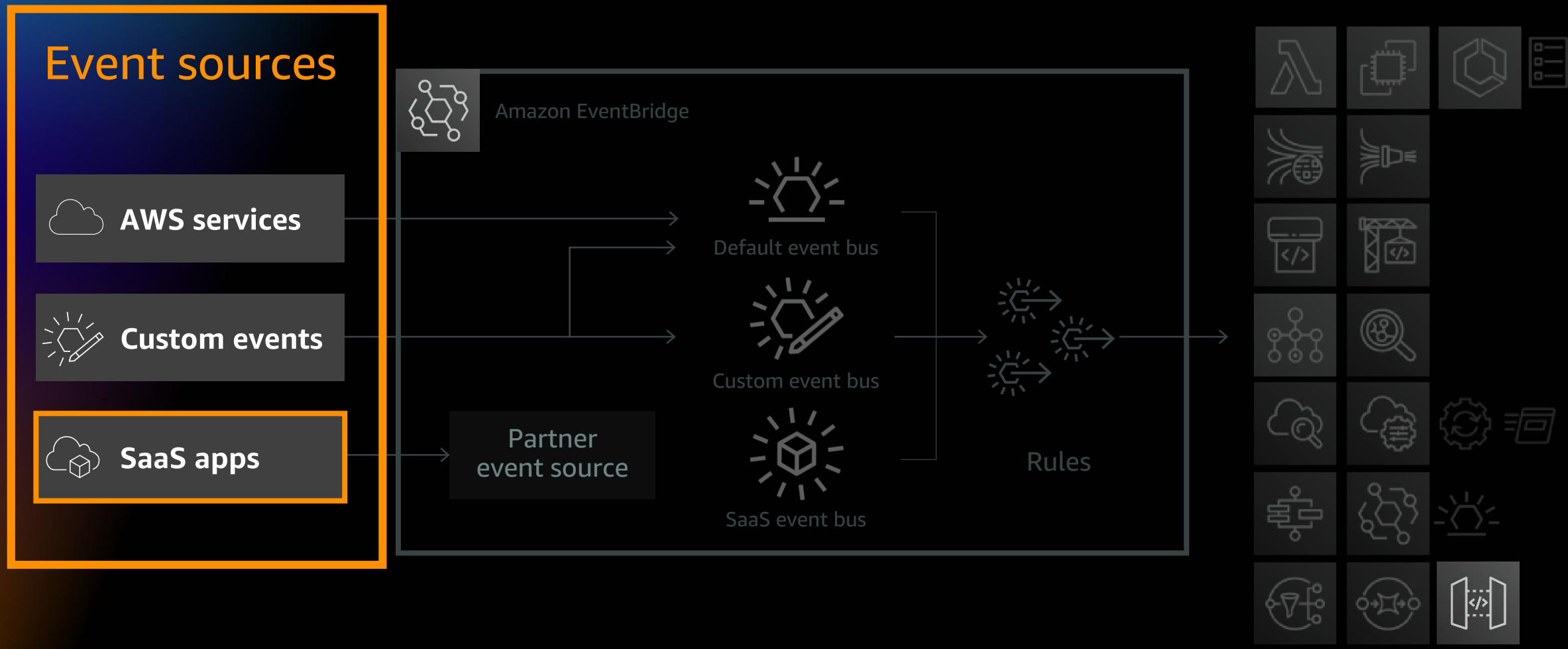


Consume events from over 115 AWS Services

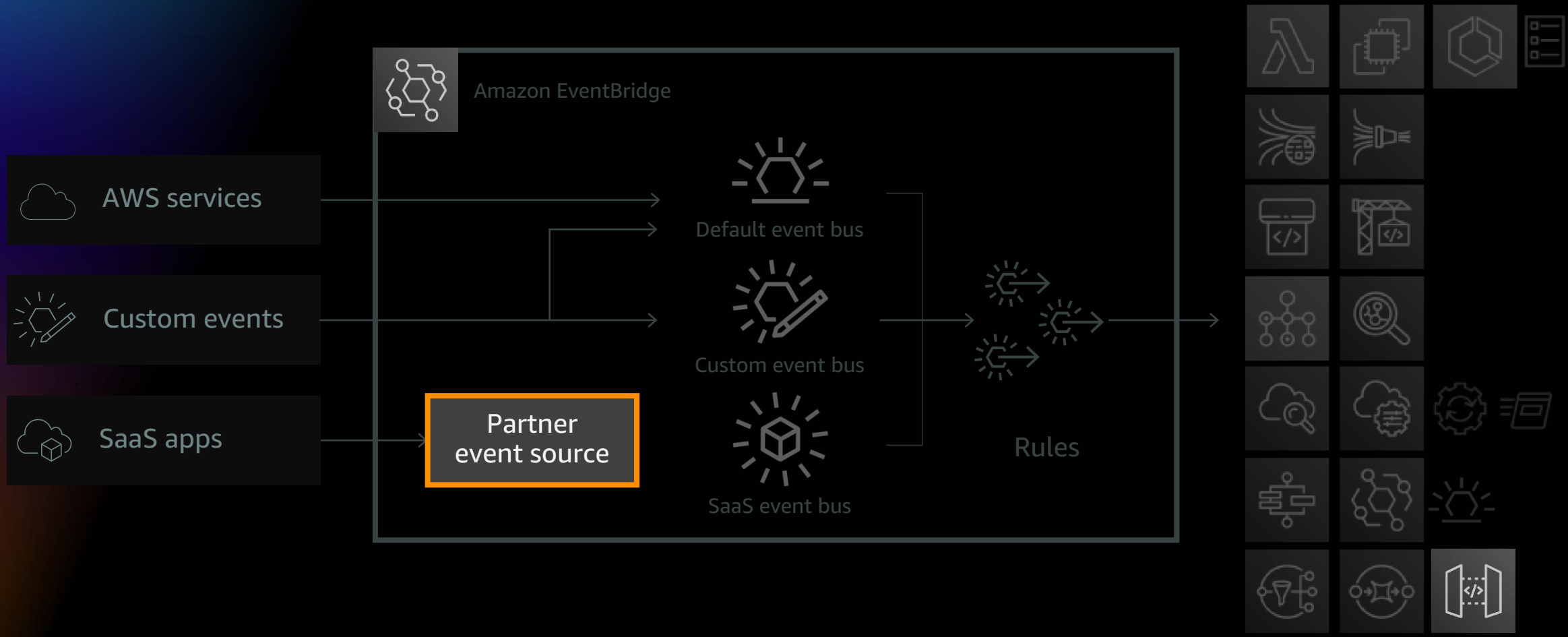
Amazon EventBridge architecture



Amazon EventBridge architecture



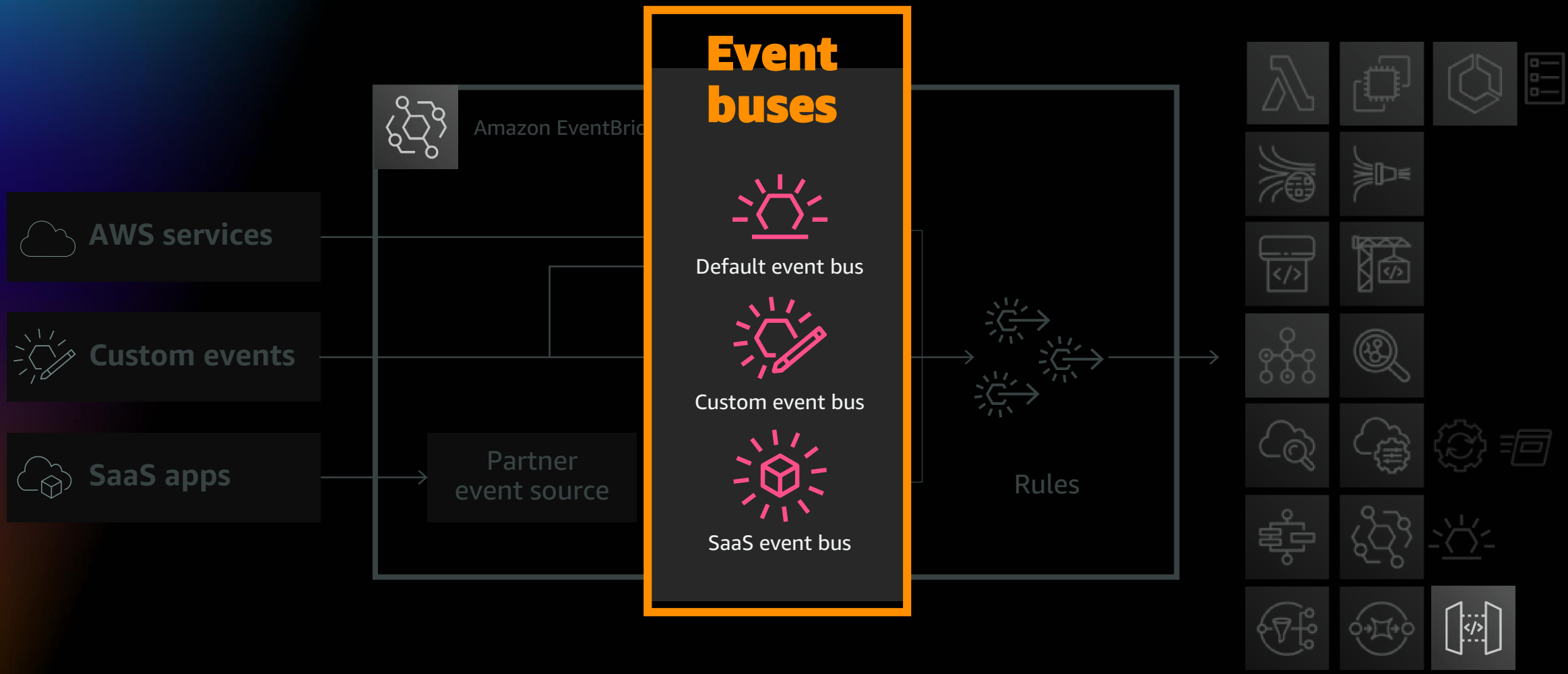
Amazon EventBridge



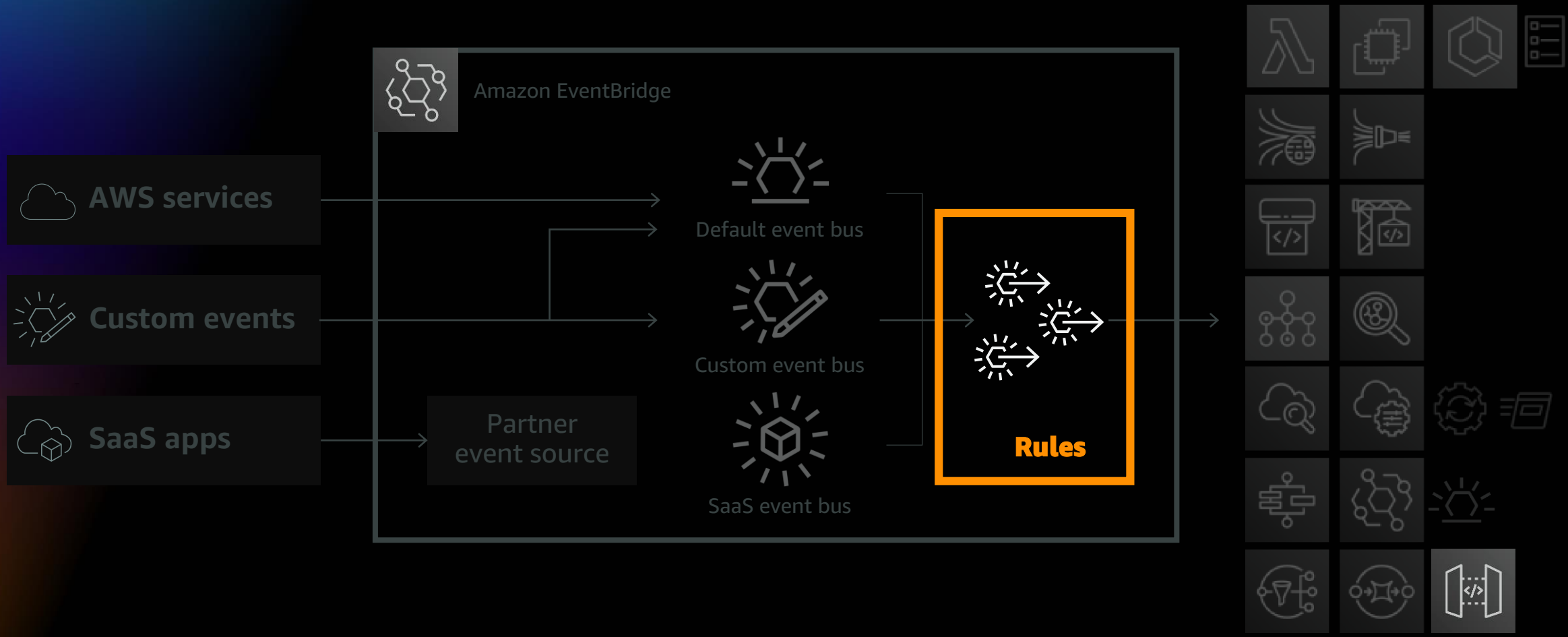
Over 36 Amazon EventBridge SaaS integrations…

https://aws.amazon.com/eventbridge/integrations/

Amazon EventBridge



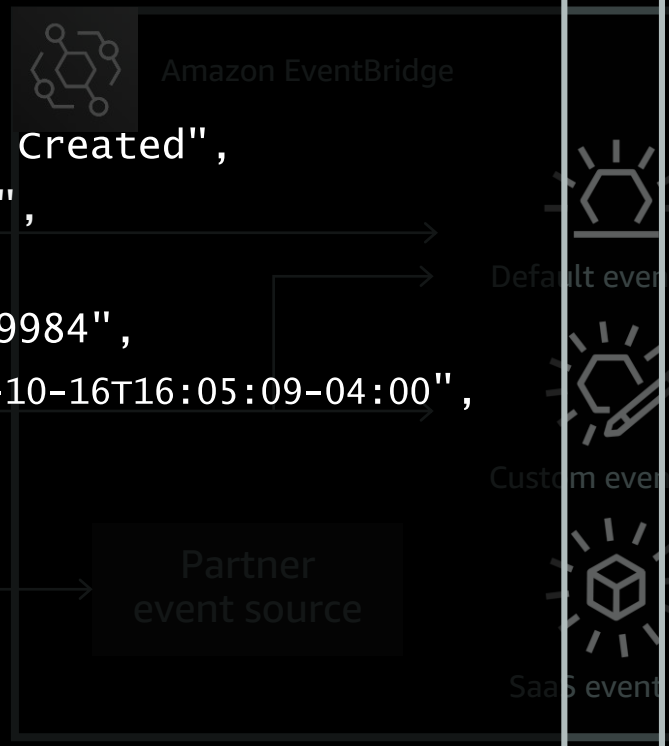
Amazon EventBridge



Amazon EventBridge

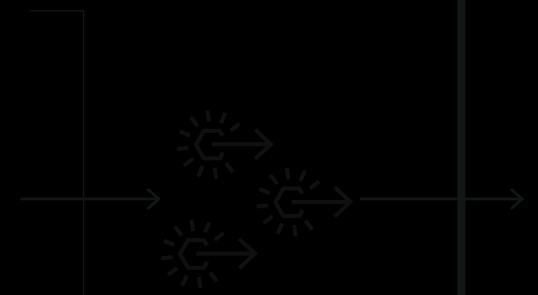
Example event:

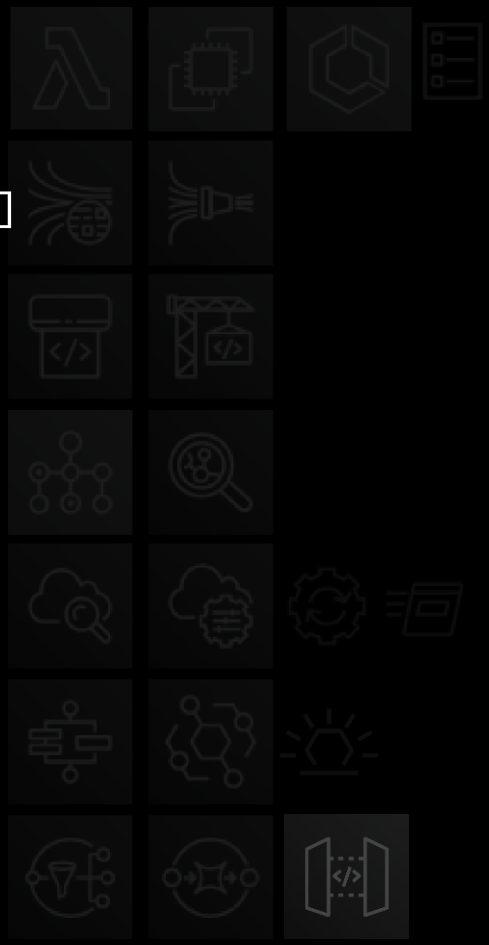
```
{
  "detail-type": "Order Created",
  "source": "com.orders",
  "detail": {
    "order_id": "1073459984",
    "created_at": "2019-10-16T16:05:09-04:00",
    "price": 24.62
    "currency": "AU",
    ...
  }
}
```



Example rule:

```
{
  "source": ["com.orders"]
}
```





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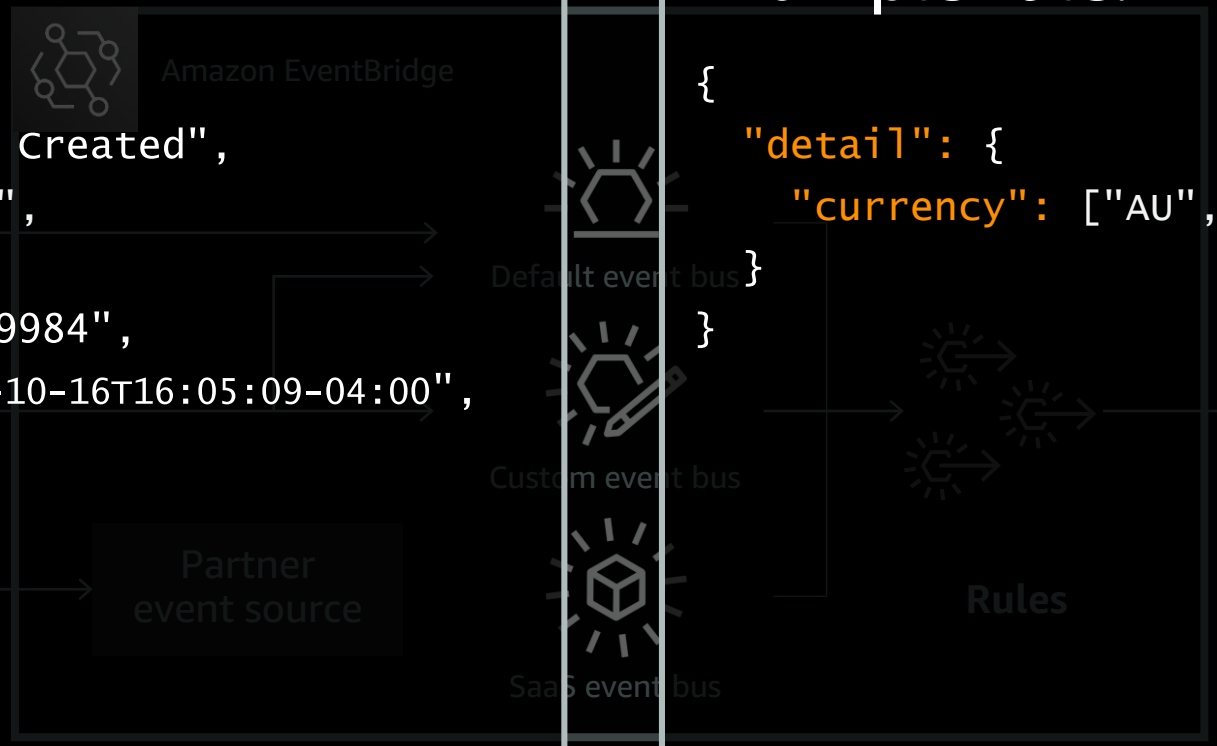
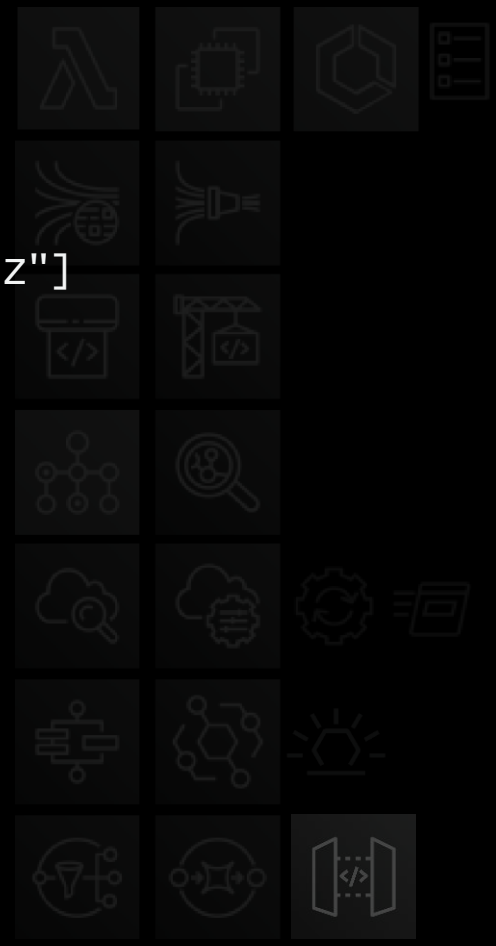


Example rule:

```
{
  "detail": {
    "currency": ["AU", "NZ"]
  }
}
```



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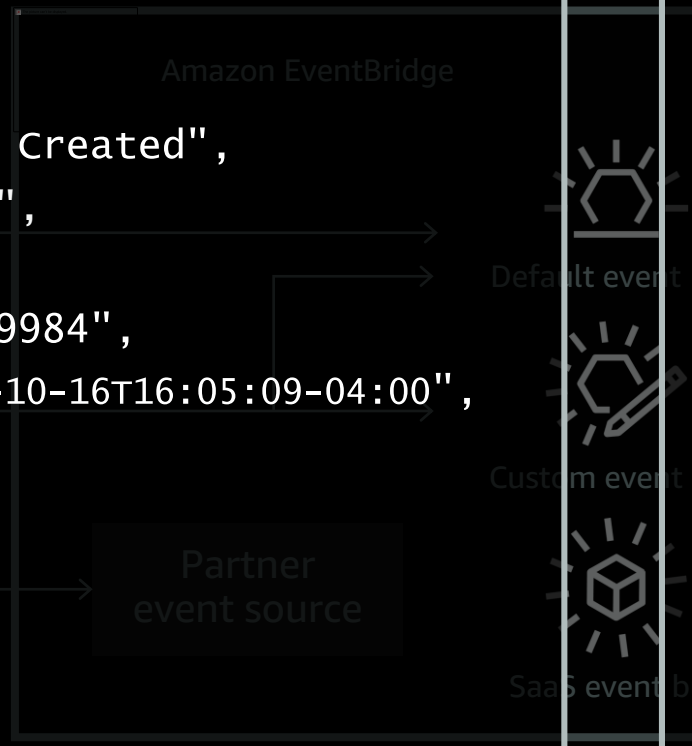
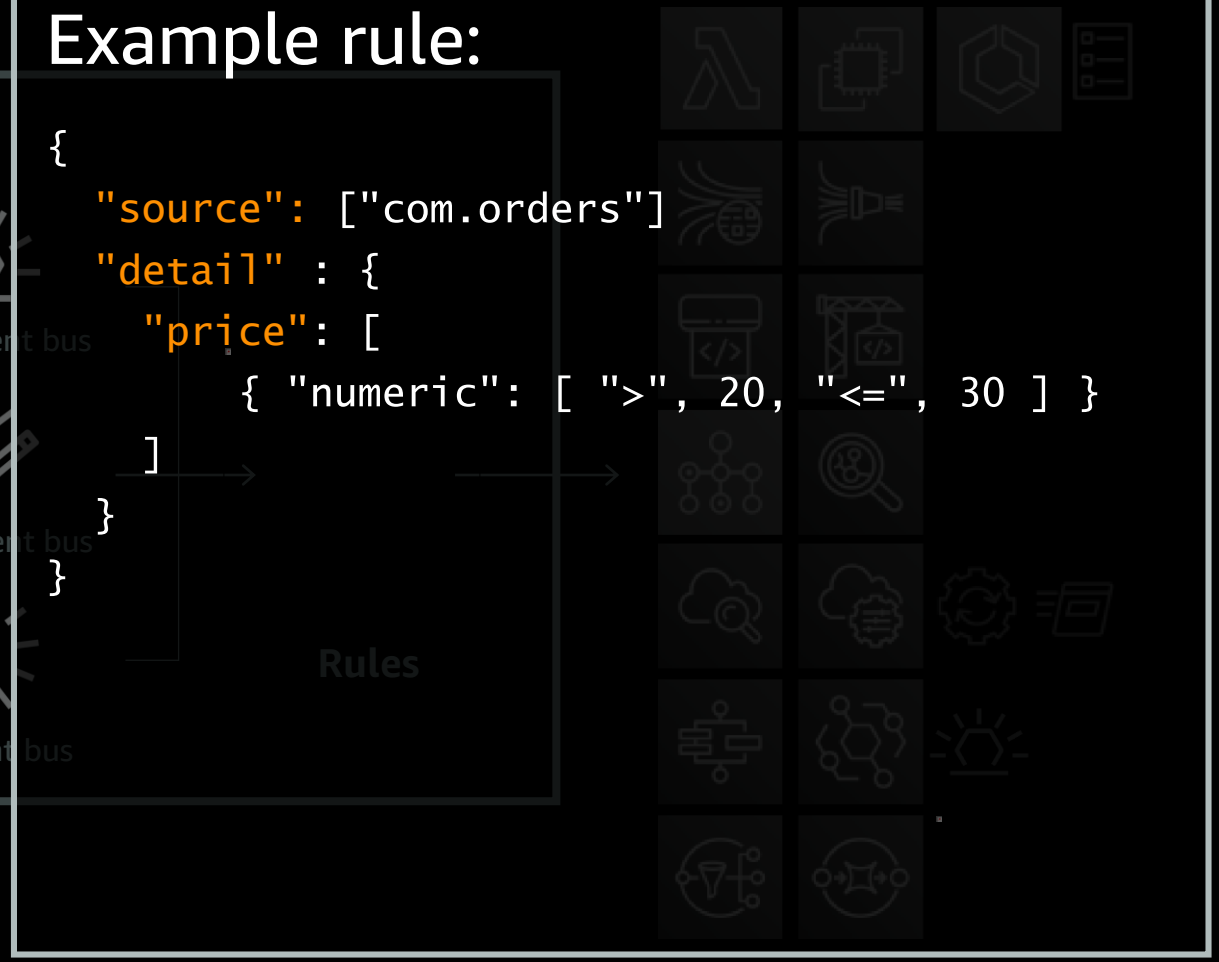
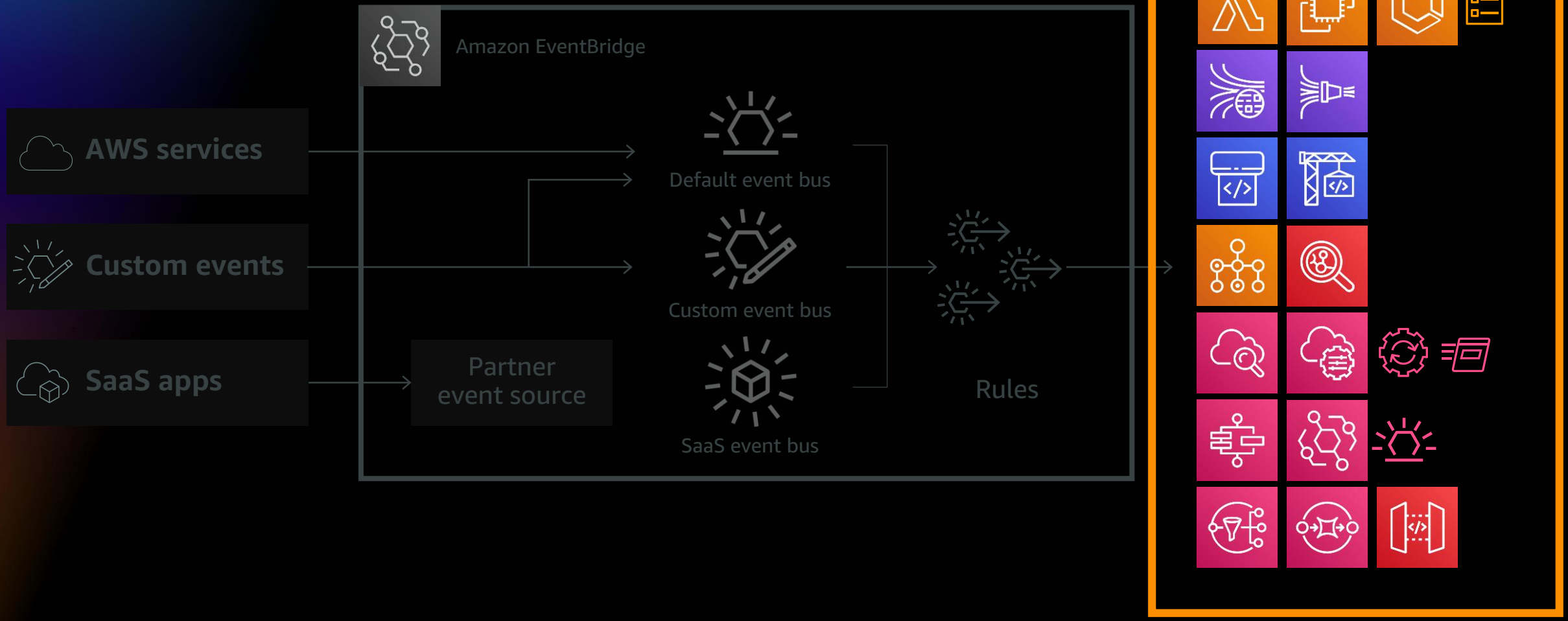


Example rule:

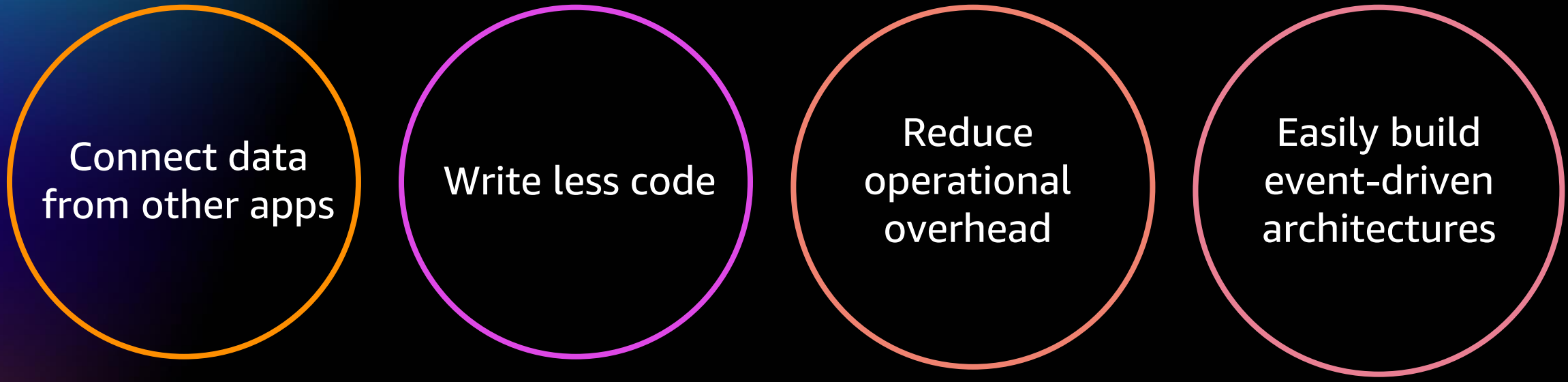
```
{
  "source": ["com.orders"]
  "detail" : {
    "price": [
        { "numeric": [ ">", 20, "<=", 30 ] }
    ]
  }
}
```



Amazon EventBridge



Amazon EventBridge: What does this mean?



Use data from AWS services, your own custom components and supported SaaS apps to trigger workflows

Ingest, filter, and deliver events without writing custom code

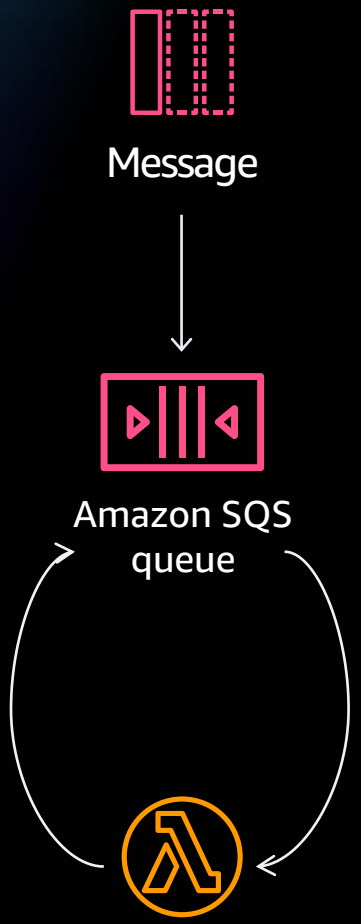
No servers to manage or software to operate. Scale automatically and only pay for events published

Simplify the process as your event targets don't need to be aware of event sources

Amazon Simple Queue Service (Amazon SQS)

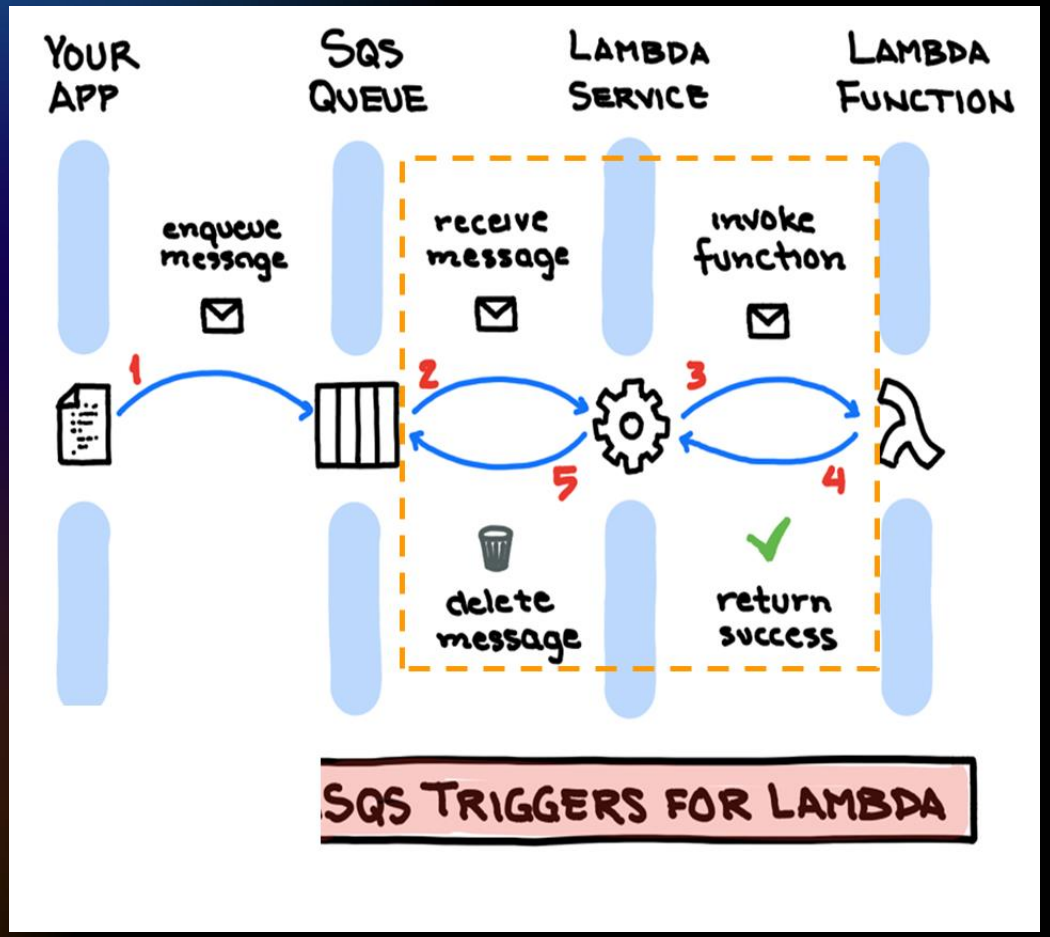
Fully managed message queuing service that enables you to decouple and scale microservices, distributed systems, and serverless applications

Amazon Simple Queue Service (Amazon SQS)



- Any volume of messages
- Messages processed in batches
- At least once delivery
- Visibility timeout allows handling failures
- Synchronous AWS Lambda invocation
- Service long-polls queues

Amazon SQS as an AWS Lambda event source



Before:
- Customer wrote a service to poll an Amazon SQS queue including logic to back off polling, delete message, etc.
- Customer monitored, scaled, and maintained

After:
- AWS Lambda service is managing message polling, scaling of consumers, receiving messages, passing on to AWS Lambda function, and deleting messages

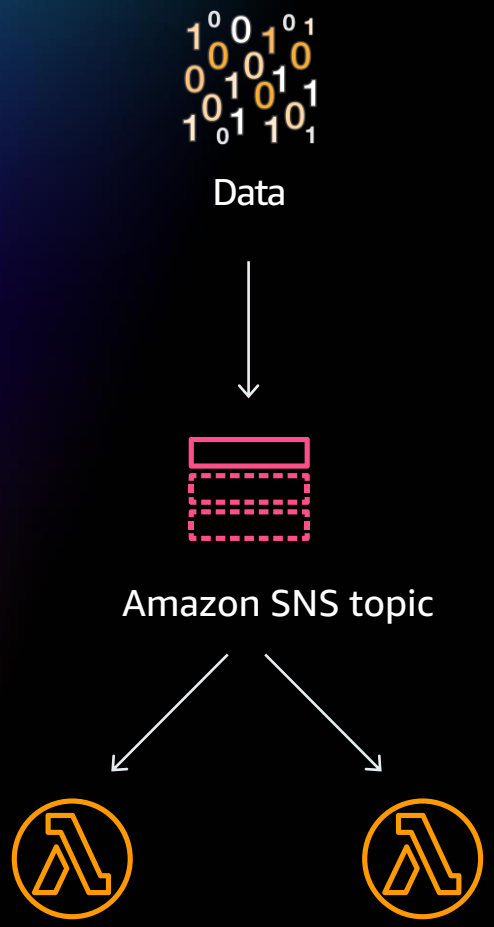
Result:
- Customers write and manage less code
- Customers leverage Amazon SQS and AWS Lambda together to automate functions

Facts:
- Amazon SQS is the #1 event source for AWS Lambda

Amazon Simple Notification Service (Amazon SNS)

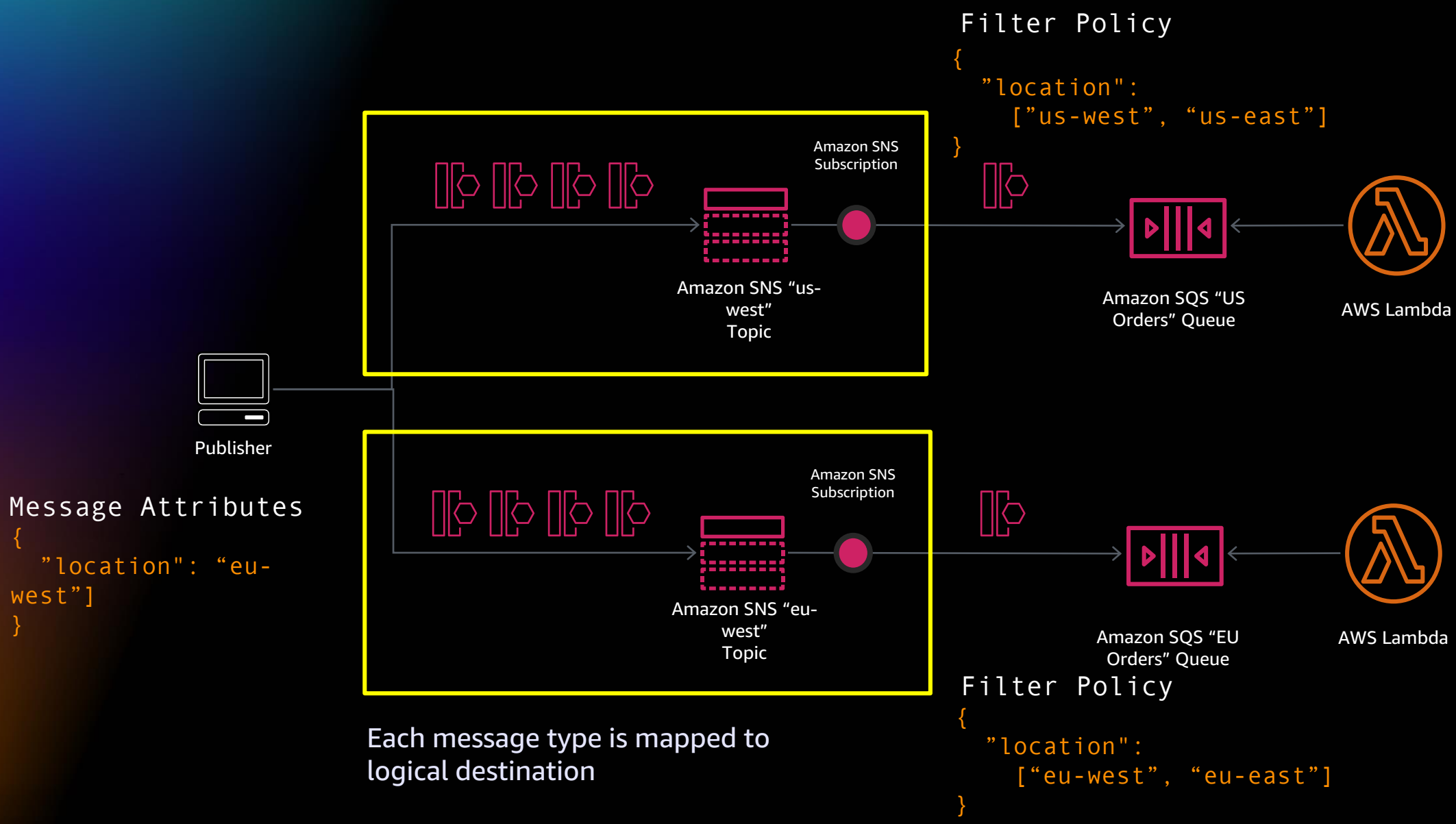
Fully managed pub/sub messaging for microservices, distributed systems, and serverless applications

Amazon Simple Notification Service (Amazon SNS)



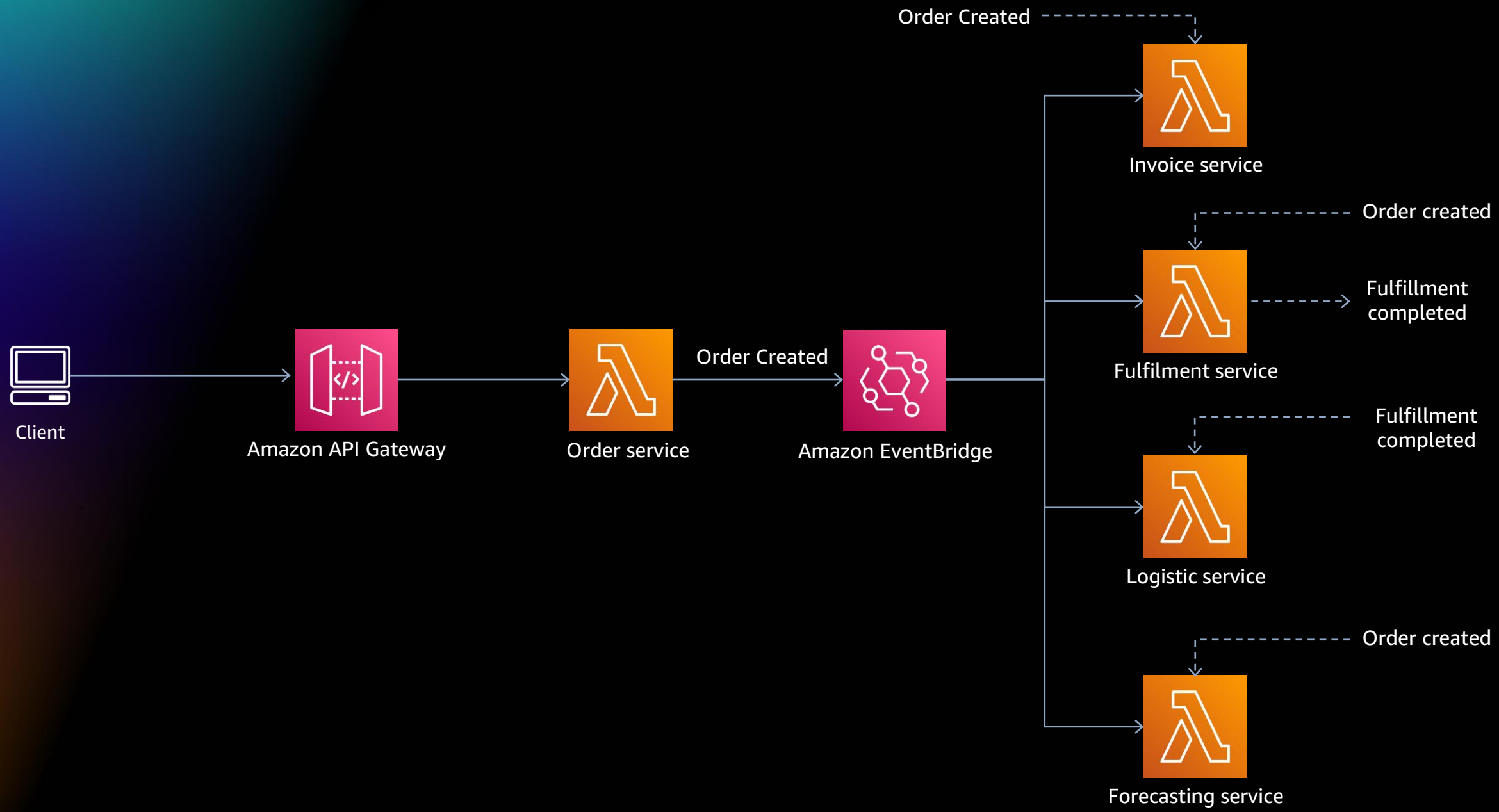
- Publish / subscribe messaging
- High throughput, highly reliable message delivery
- Messages are published to a Topic with multiple subscribers – “fan out”
- Messages can be filtered and only sent to certain subscribers
- Asynchronous AWS Lambda invocation

Better together: Amazon SQS/Amazon SNS



Each message type is mapped to logical destination

Demo



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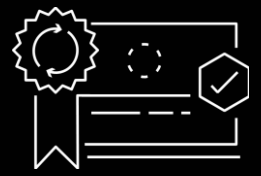

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