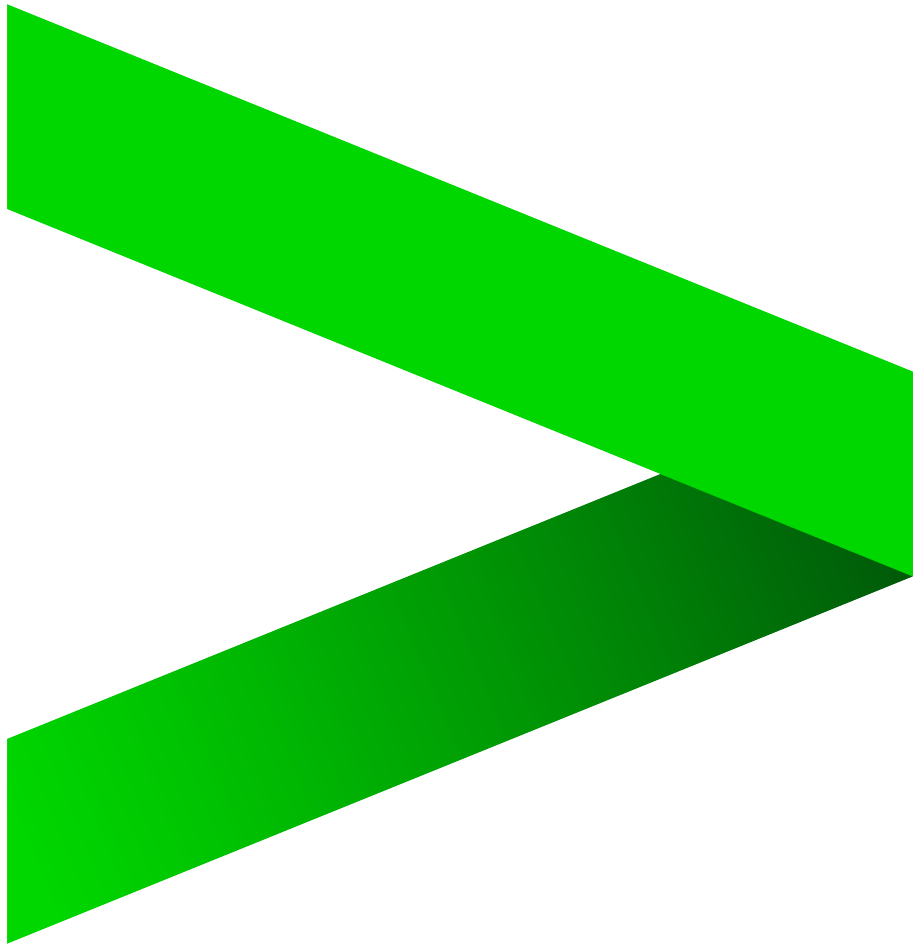
THE EVENT-DRIVEN UI

BRIDGING THE GAP



KEVIN BADER

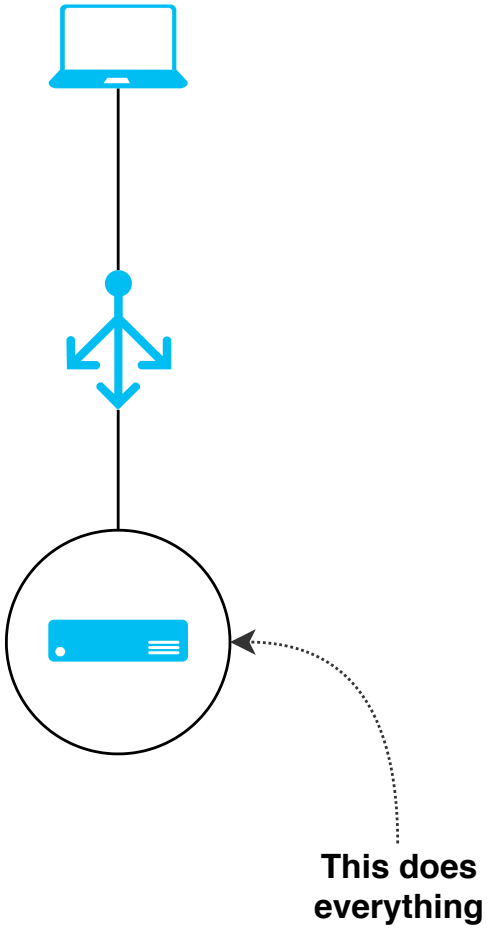
accenture technology

AGENDA

- **Situation**
- **Vision**
- **Challenges**
- **Solution**
- **Conclusion**

SITUATION

One backend, one frontend:
one source of data and events.

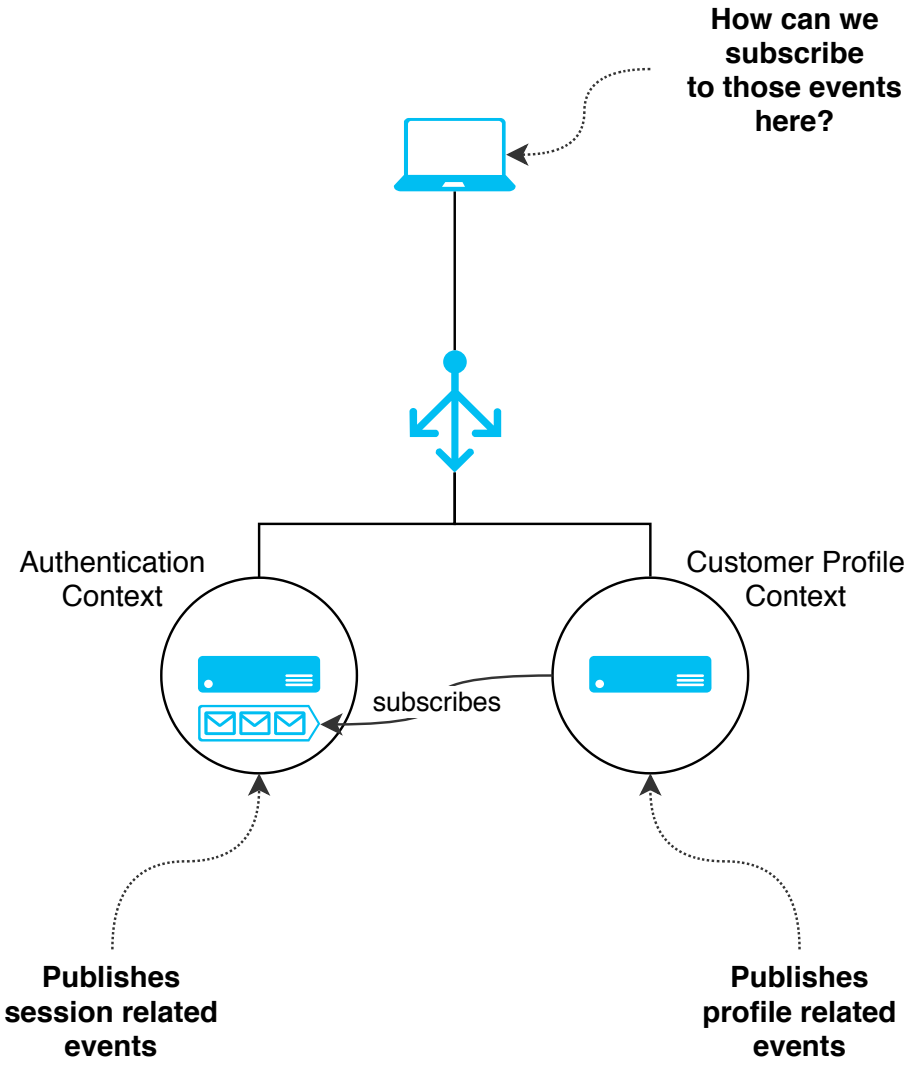


SITUATION

Microservices group functionality by domain/context.

Events decouple microservices.

Still only one frontend.



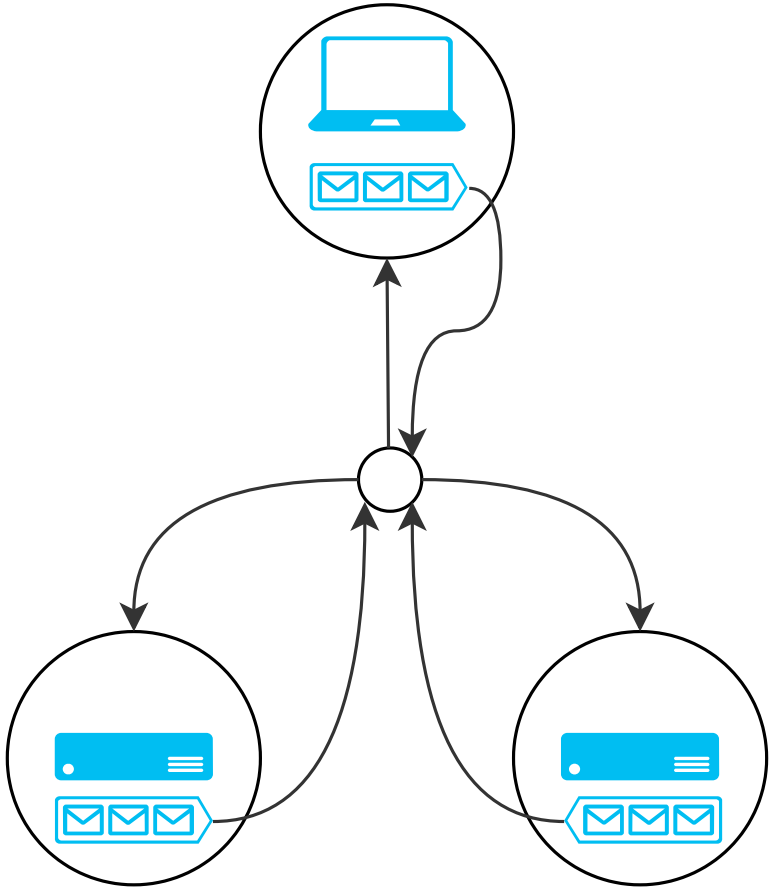
VISION: AN EVENT-DRIVEN WORLD

Microservices emit events.

Frontends consume and produce events the same way other microservices do.

Only open standards.

Frontends not aware how events are stored.



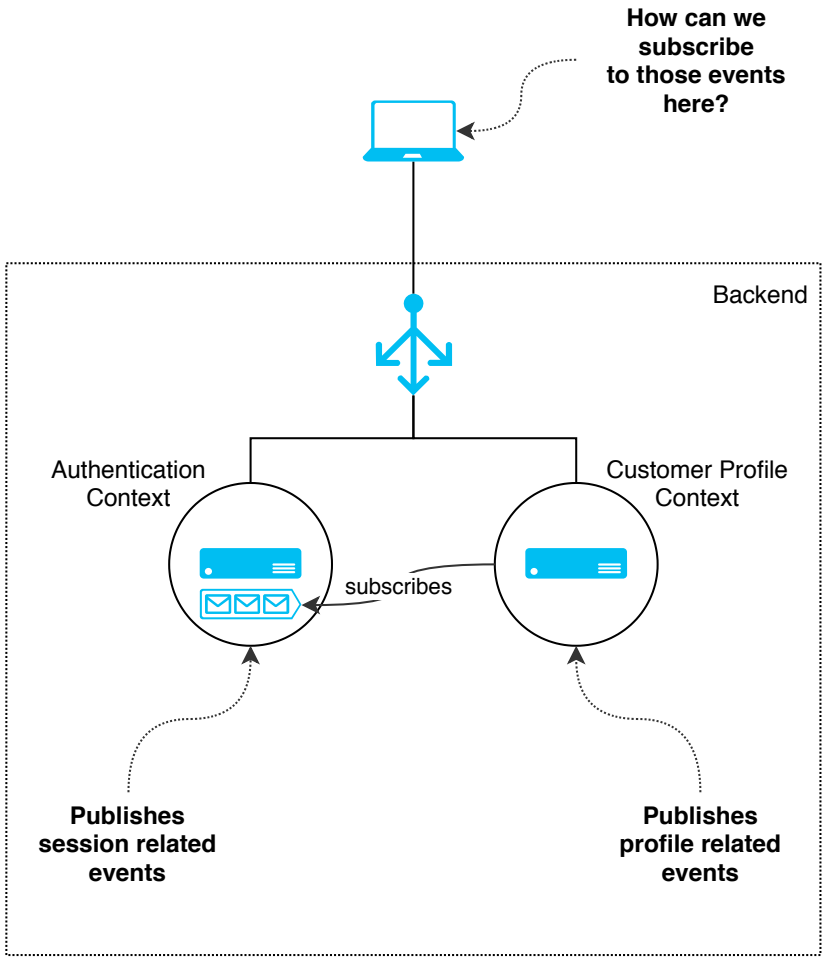
VISION: GOALS

Microservices should

- not handle long-lived connections
- not publish “special” events for frontend consumption

Frontends should

- be agnostic of event partitioning on the backend
- not rely on proprietary formats
- be able to publish events
- be able to control what events they are subscribed to

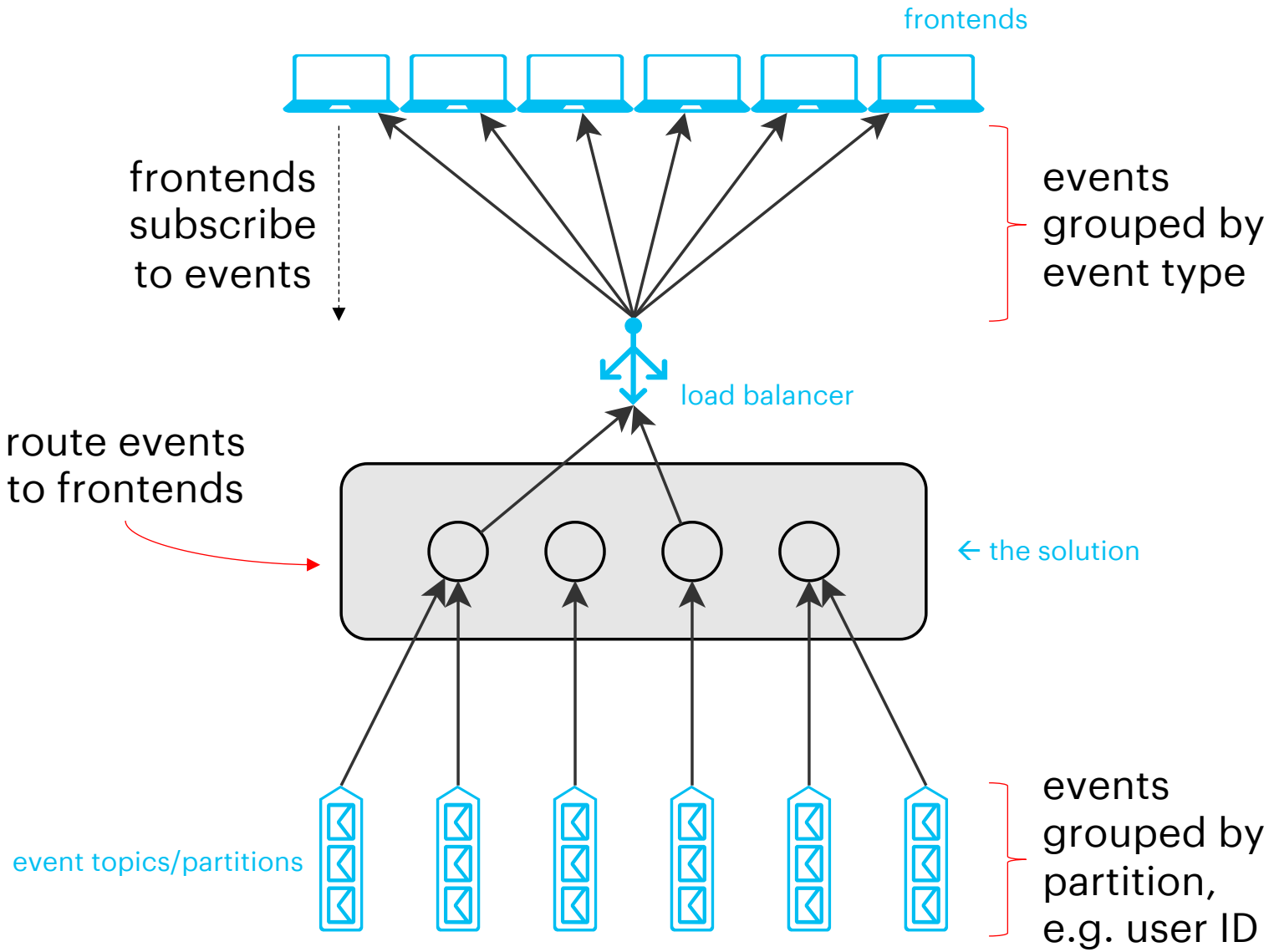


CHALLENGES

1. Scaling out: number of users, rate of events
2. Event sources
3. Synchronous request, asynchronous processing
4. Authorization

1. SCALING OUT

- **Many users, few online**
- **Events from *all* microservices**



2. EVENT SOURCES

- **Kafka as the de-facto standard for implementing event-driven architecture:**
  - Confluent Kafka platform
  - Confluent Cloud on GCP
  - Azure Event Hubs has Kafka-compatible API
  - Amazon Managed Streaming for Kafka (MSK)
- **Publish via HTTP**
  - Easier to setup and use during dev and test
  - Used when decrypting data on-the-fly

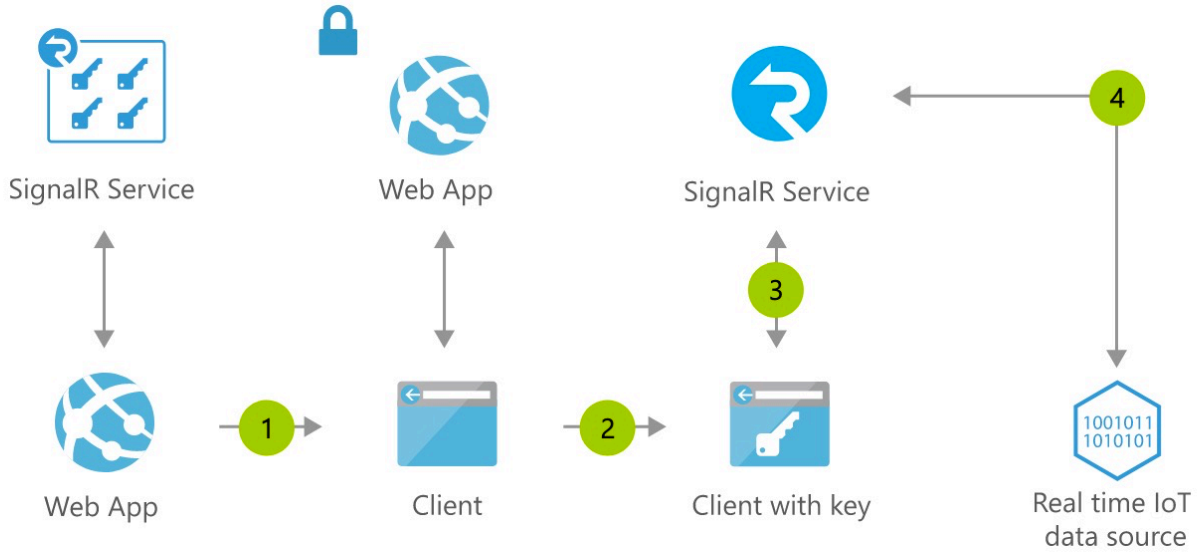
3. SYNC REQUEST, ASYNC PROCESSING

- **Asynchronous, event-driven processing is the new default**
  - Decoupling: easy to add/remove microservices
  - Deployment: easy to deal with upgrades/rollbacks/downtime
- **But: frontend and 3rd party clients often expect immediate response**
  - Requires “conversion” of asynchronously processed result into synchronous request-response

4. AUTHORIZATION

- **Is ESSENTIAL: any event may be subscribed to**
- **As little business logic at possible**
- **As pluggable as possible**

CANDIDATE: ASP.NET SignalR



OVERVIEW | FLOW

1. Web app connects to SignalR Service and receives token
2. User connects to web app and gets SignalR endpoint and token
3. User connects to SignalR Service
4. Data from real-time source sent to SignalR Service and user

Learn more >

https://azure.microsoft.com/en-us/services/signalr-service/

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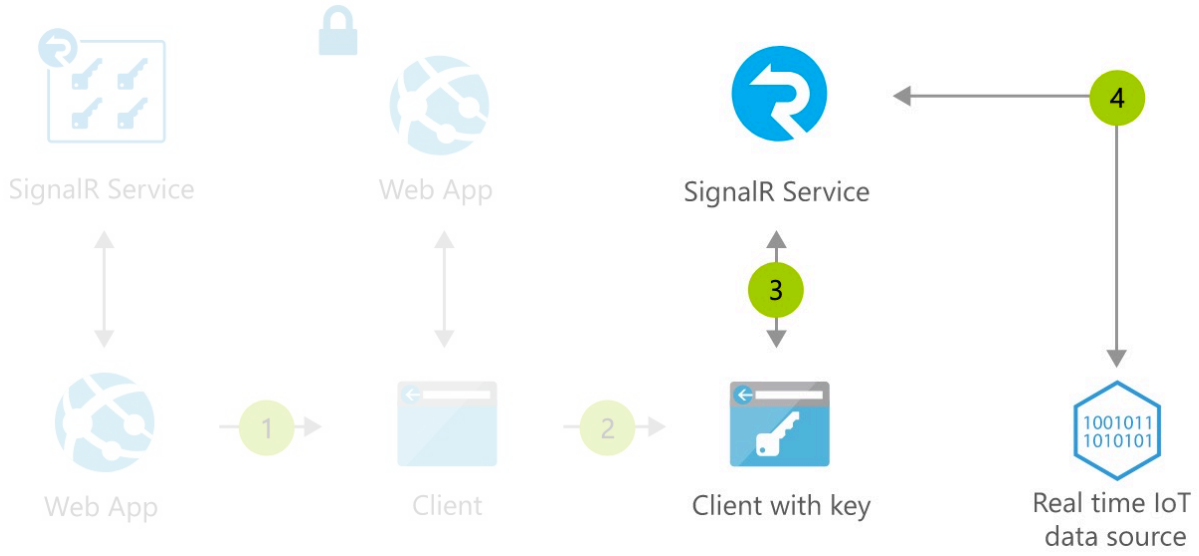

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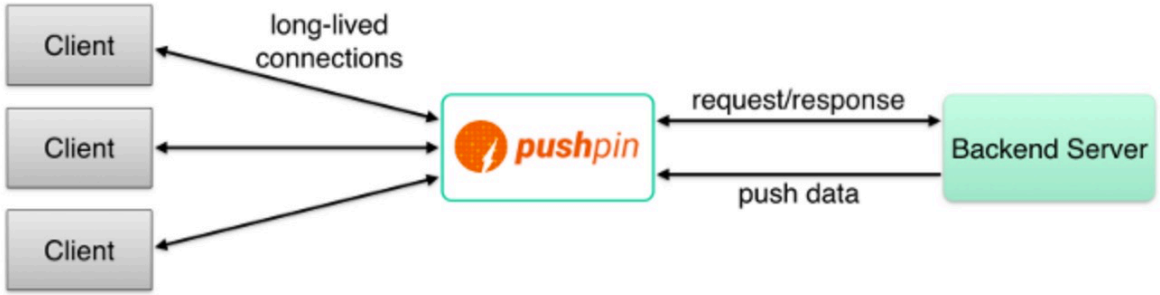
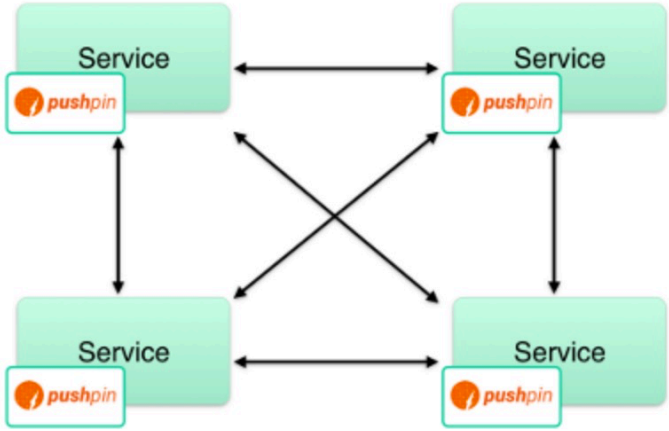
CANDIDATE: Pushpin



Pushpin has no built-in support for connecting to specific queues/brokers. Instead, you can write a small worker program that runs alongside Pushpin, to receive from the queue and send to Pushpin. Often you'll need to transform the data as well, and you can write any data transformation code in the same worker program.



https://pushpin.org/docs/about/

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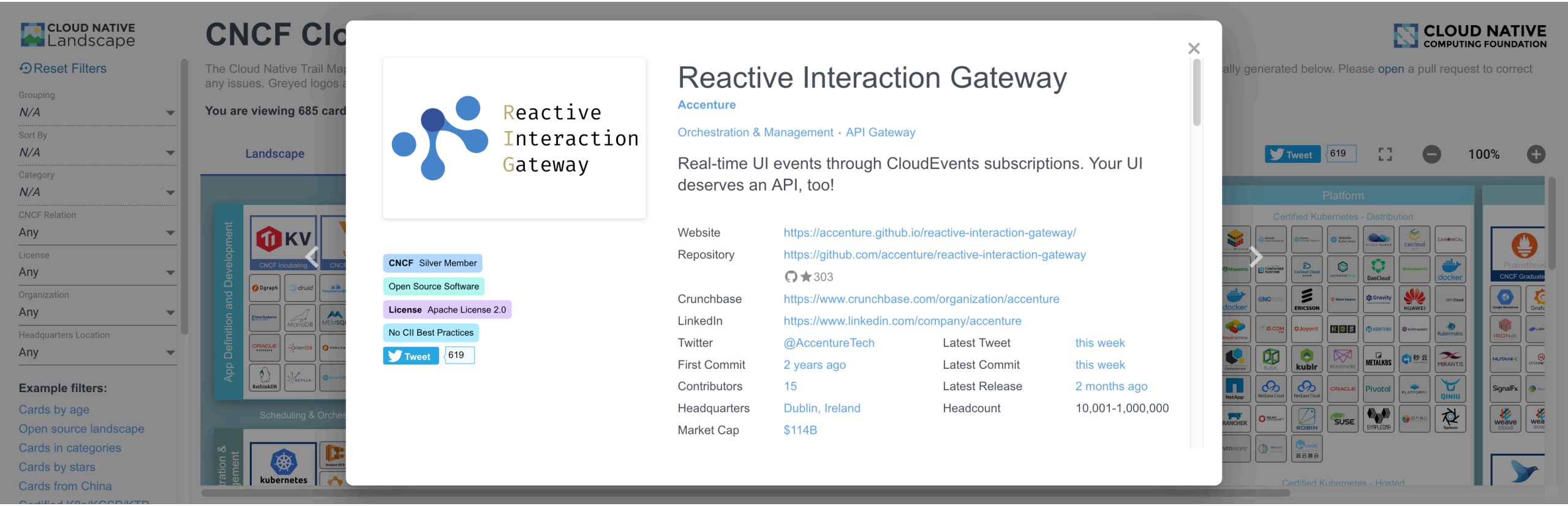
SOLUTION: Reactive Interaction Gateway



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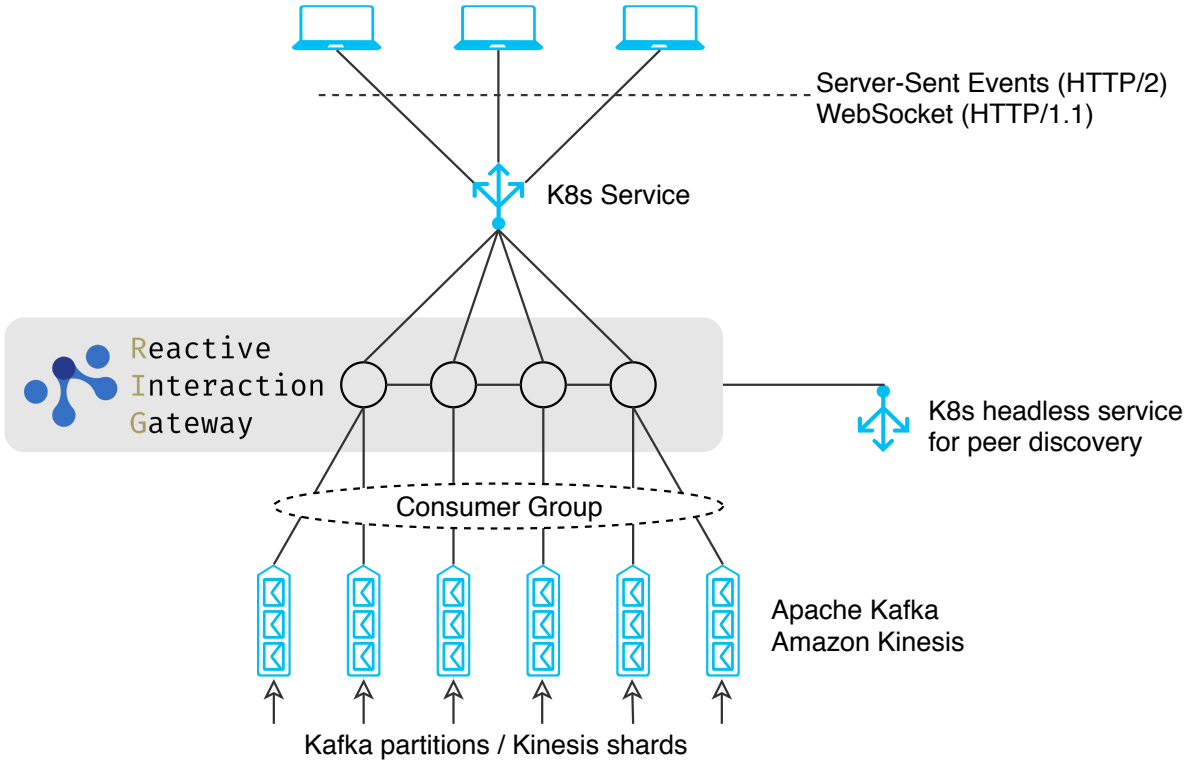
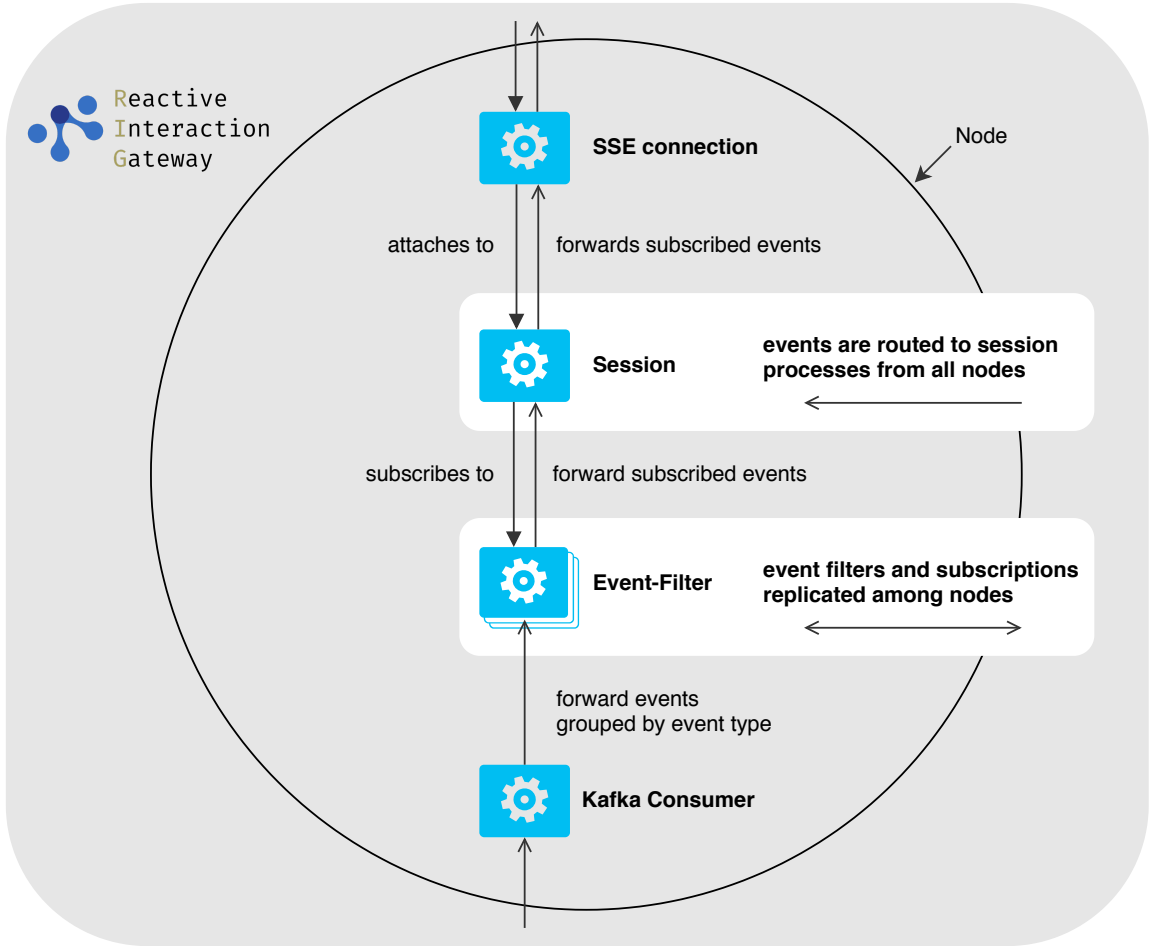
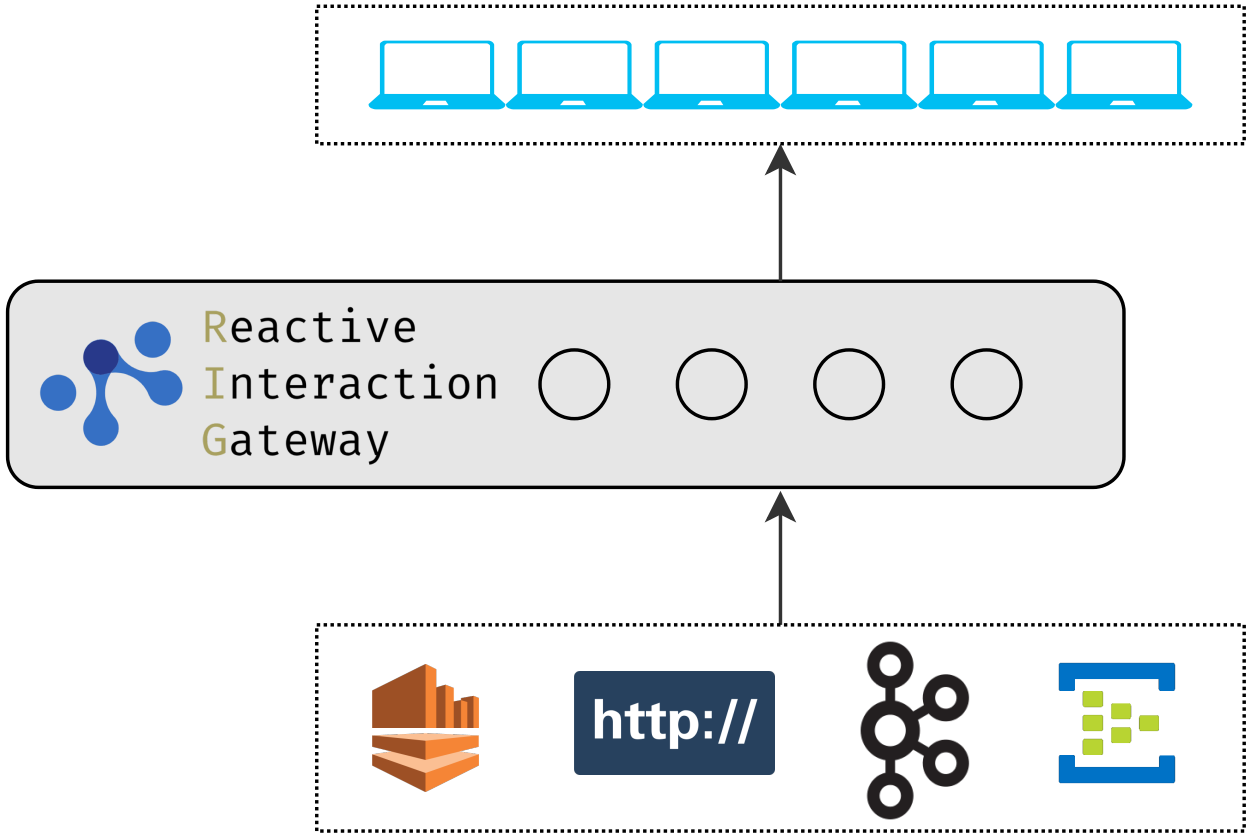
1. SCALING OUT





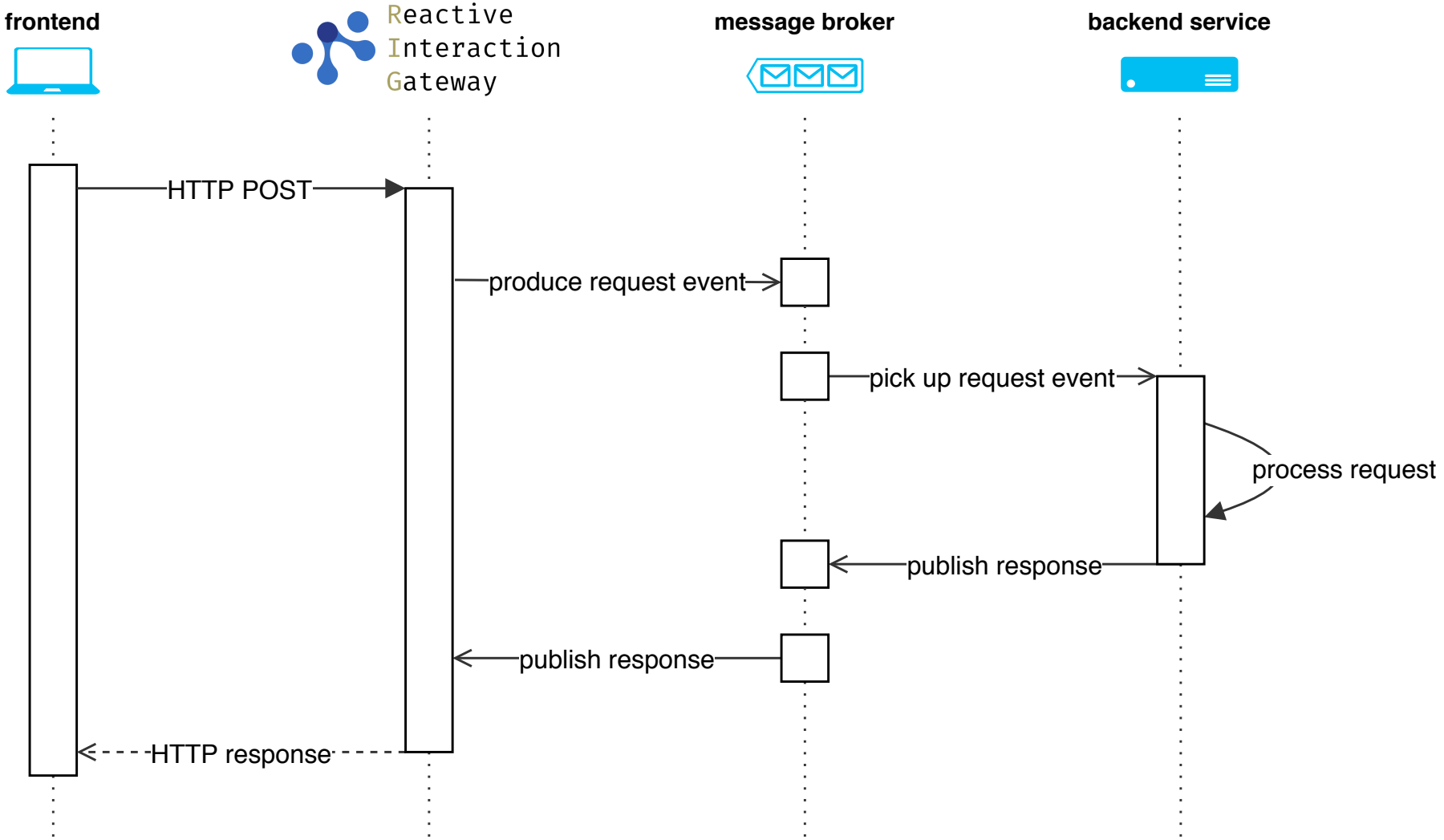
2. EVENT SOURCES



3. SYNC REQUEST, ASYNC PROCESSING

the frontend sees a **traditional API**

while processing is actually **asynchronous**

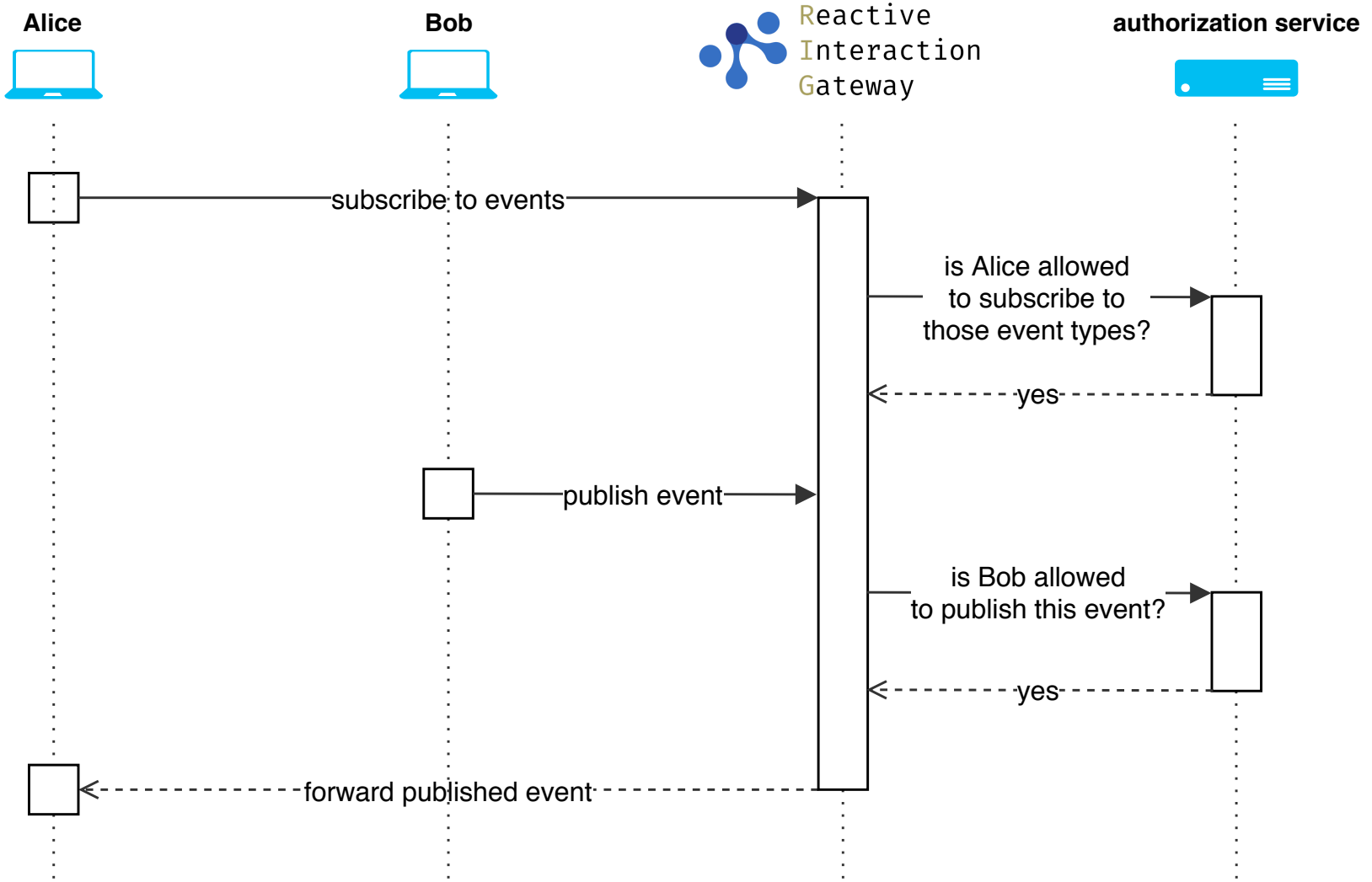


4. AUTHORIZATION

subscribing to events
publishing events

authorized by

JWT validation or
calling a service

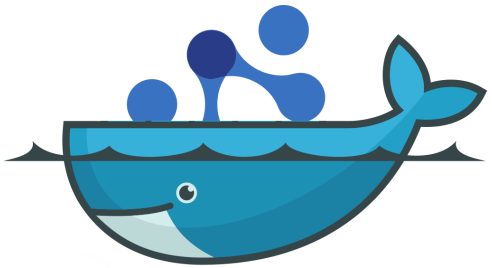


Reactive Interaction Gateway

- **Free Software, Apache 2.0 License, developed on GitHub**
- **Open standards:**
  - **CloudEvents (CNCF Sandbox project)**
  - **HTTP/1.1 and HTTP/2**
  - **Server-Sent Events (SSE)**
  - **WebSocket**
  - **Kafka**

Reactive Interaction Gateway

- **No external dependencies**
- **Configuration using environment variables**
- **Available on Docker Hub**
  ```
  $ docker pull accenture/reactive-interaction-gateway
  ```
- **Scales like a stateless service**
  ```
  $ kubectl scale deployment rig --replicas=10
  ```



CONCLUSION

- **Real-time UI for great user experience**
- **Extending event-driven architecture to the frontend decouples frontend and backend**
- **The Reactive Interaction Gateway enables this in a scalable way, using open standards**

Check out the Reactive Interaction Gateway and let us know what you think!

github.com/Accenture/reactive-interaction-gateway

Thanks to:

- Dominik Wagenknecht <- inventor
- Mario Macai <- long-term core team member
- Accenture's Software Innovation team

GitHub: kevinbader
Twitter: @KevnBadr

APPLICATION-LEVEL CONCERNS

- **Duplicate events**
- **Lost events**
- **Out-of-order events**