



Streams & Services: From Zero to Hero

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Agenda



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- Intro to NATS
- Demo!
 - Decentralized Auth
 - Websockets
 - Kubernetes.yaml

About NATS



NATS is a ten year old, production proven, cloud-native messaging system made for developers and operators who want to spend more time doing their work and less time worrying about how to do messaging.

- ✓ DNA: **Performance, simplicity, security, and availability**
- ✓ Built from the ground up to be cloud native
- ✓ Multiple qualities of service
- ✓ Support for multiple communication patterns
- ✓ Over 30 client languages

About NATS



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- The server is a single binary deployable anywhere
- 10.2 MB docker image with no external dependencies
- “Text-based” protocol with a handful of verbs

PUB | HPUB | SUB | UNSUB | CONNECT | INFO | MSG | HMSG | -ERR | +OK | PING | PONG

- Low Configuration
 - ✓ Clients only need a url and credentials
 - ✓ Servers auto-discover
 - ✓ You can share configuration files amongst servers
- Simple and Straightforward API

NATS Clients



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nats.go

Golang client for NATS, the cloud native messaging system.



go golang microservices nats cloud-native

Go ★ 2,265 🍴 303 📄 Apache-2.0 3 issues need help Updated a day ago

nats.rb

Ruby client for NATS, the cloud native messaging system.



ruby client messaging cncf pubsub nats eventmachine

Ruby ★ 823 🍴 131 📄 Apache-2.0 Updated a day ago

nats.java

Java client for NATS



java client middleware messaging nats messaging-library

Java ★ 194 🍴 68 📄 Apache-2.0 Updated a day ago

nats.ex

Elixir client for NATS, the cloud native messaging system. <https://nats.io>



client elixir nats nats-io

Elixir ★ 33 🍴 11 📄 MIT 1 issue needs help Updated 6 days ago

nats.js

Node.js client for NATS, the cloud native messaging system.



JavaScript ★ 672 🍴 96 📄 Apache-2.0 Updated 8 days ago

nats.net

The official C# Client for NATS



client visual-studio csharp messaging message-bus pubsub

C# ★ 232 🍴 63 📄 Apache-2.0 3 issues need help Updated 2 days ago

nats.c

A C client for NATS



c messaging message-bus message-queue messaging-library

C ★ 139 🍴 45 📄 Apache-2.0 Updated 7 days ago

nats.py

An asyncio based Python 3 client for NATS



python nats python3 asyncio cloud-native aio-nats

Python ★ 187 🍴 34 📄 Apache-2.0 Updated 4 days ago

Streams & Services

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NATS in a Nutshell



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- **Streams**

- *A flow* of data
- Fan out

- **Services**

- Do some work and return a result
- Load balanced

NATS Subjects



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A subject is simply a string representing an interest in data.

- Simple subject: **foo** or **weather**
- Hierarchically Tokenized: **foo.bar**, **weather.us.co.denver**
- Wildcard subscriptions
 - ✓ **foo.*** matches **foo.bar** and **foo.baz**.
 - ✓ **foo*.bar** matches **foo.a.bar** and **foo.b.bar**.
 - ✓ **foo.>** matches any of the above
 - ✓ **>** matches everything in NATS
- Unique subjects for 1:1 addressability

NATS Client API



- Request/Reply (**Services**)
- Publish/Subscribe (**Streams**)
- Load Balanced Queue Subscribers (**Streams** or **Services**)

Streams: Publish/Subscribe



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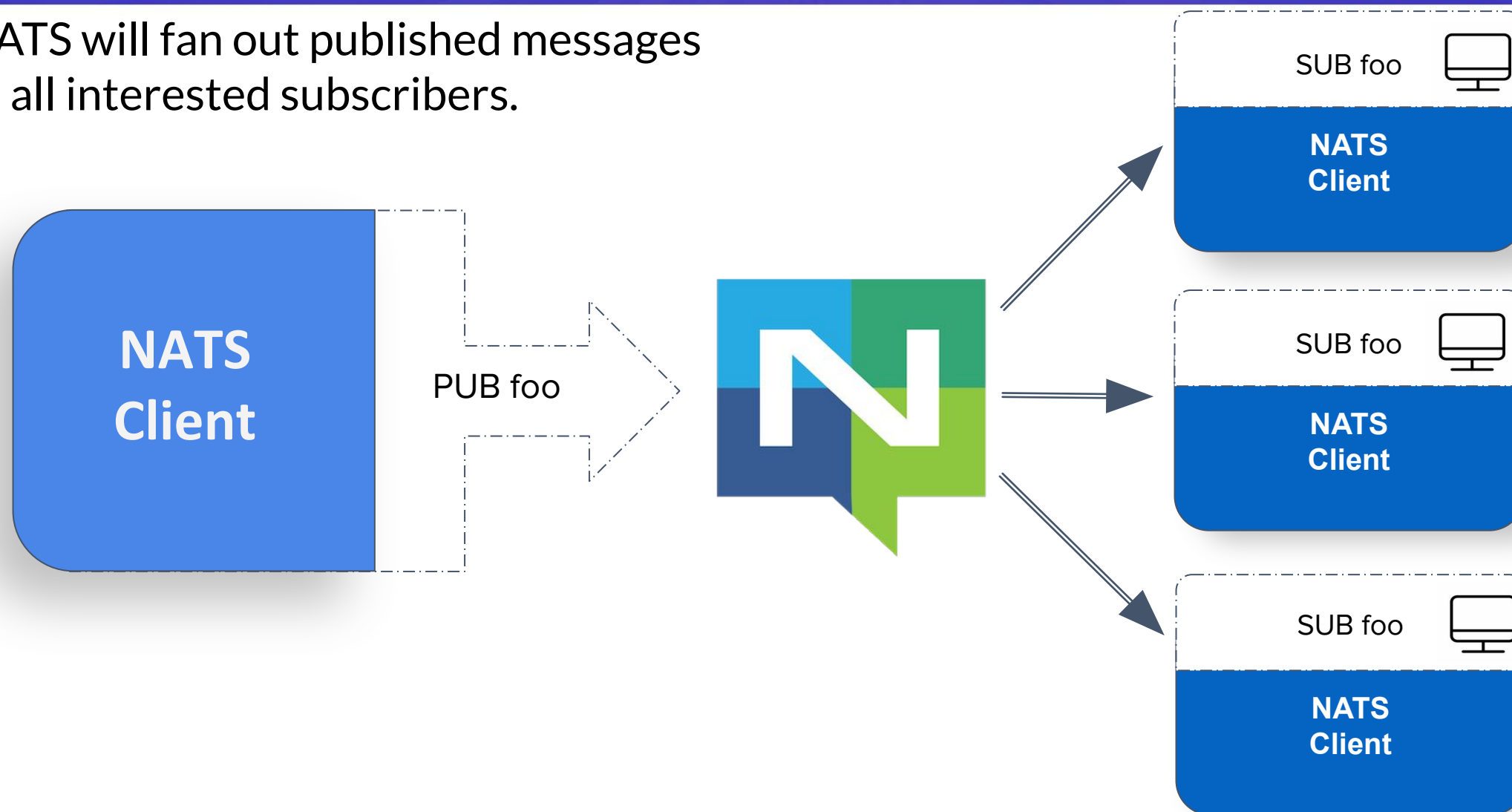


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NATS will fan out published messages to all interested subscribers.



Services: Request/Response



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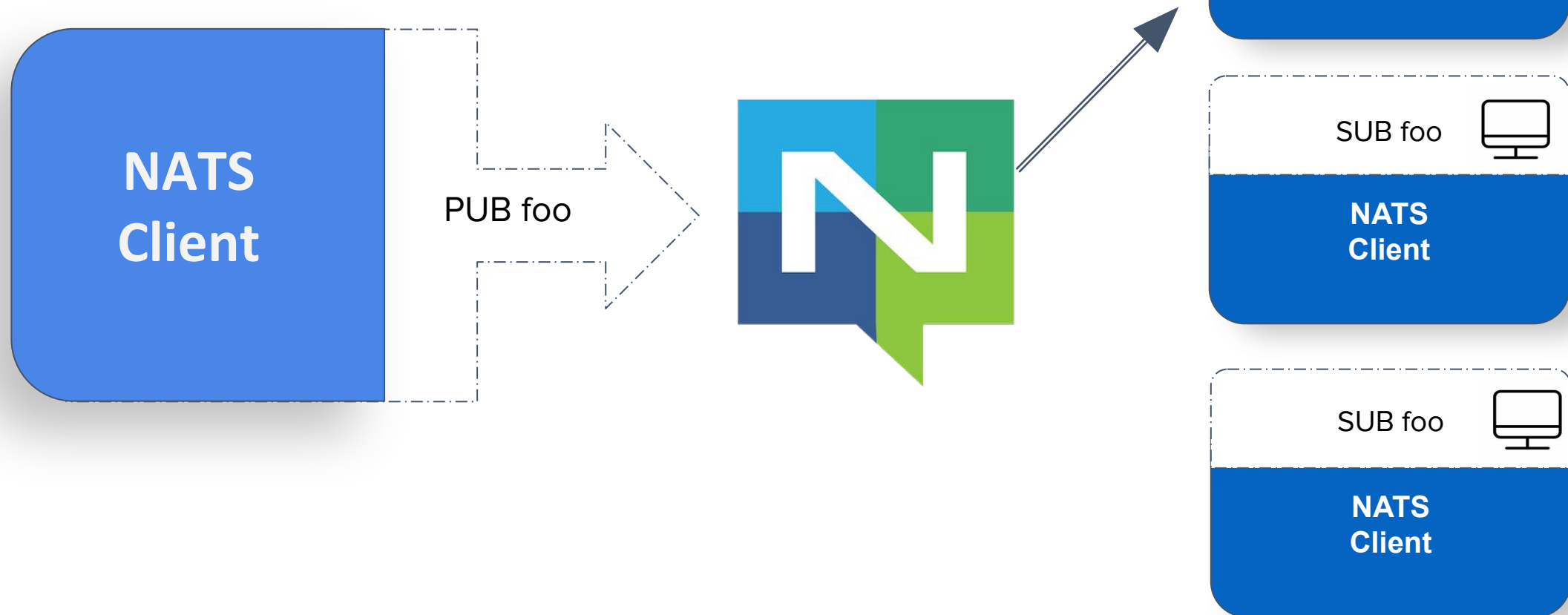
Virtual

Using unique reply subjects, clients can make requests to services that respond only to the request, creating a 1 to 1 relationship.



Load Balancing

When subscribers are grouped together in a named queue group, NATS will randomly distribute messages to the subscribers, allowing NATS to act as a load balancer for services.



Cloud + Edge: Multi-tenancy, Multi-region



Accounts (Multi-tenancy)



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Streams

```
accounts {  
  acme {  
    users [  
      { user: alice, pass: foo }  
    ]  
  
    exports = [  
      { stream: "acme.>" }  
    ]  
  }  
  
  cncf {  
    users [  
      { user: bob, pass: bar }  
    ]  
  
    imports = [  
      { stream: {  
        account: "acme",  
        subject: "acme.>" },  
        prefix: "imports" }  
    ]  
  }  
}
```

Export

```
for range time.NewTicker(1 * time.Second).C {  
    nc.Publish("acme.hello", []byte("Hello world"))  
}
```

Import

```
// Receives message at: imports.acme.hello  
nc.Subscribe("imports.>", func(m *nats.Msg) {  
    log.Printf("[%s]: %s", id, string(m.Data))  
})
```


Accounts (Multi-tenancy)



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Services

```
accounts {
  acme {
    users [
      { user: alice, pass: foo }
    ]

    exports = [
      { service: "hello" }
    ]
  }

  cncf {
    users [
      { user: bob, pass: bar }
    ]

    imports = [
      { service: {
        account: "acme",
        subject: "hello" },
        to: "cncf.hello" }
    ]
  }
}
```

Export

```
nc.QueueSubscribe("hello", "worker", func(m *nats.Msg) {
  log.Printf("[%s]: %s", id, string(m.Data))
  nc.Publish(m.Reply, []byte("hi!"))
})
```

Import

```
nc.Request("cncf.hello", []byte("world"),
```

Topologies



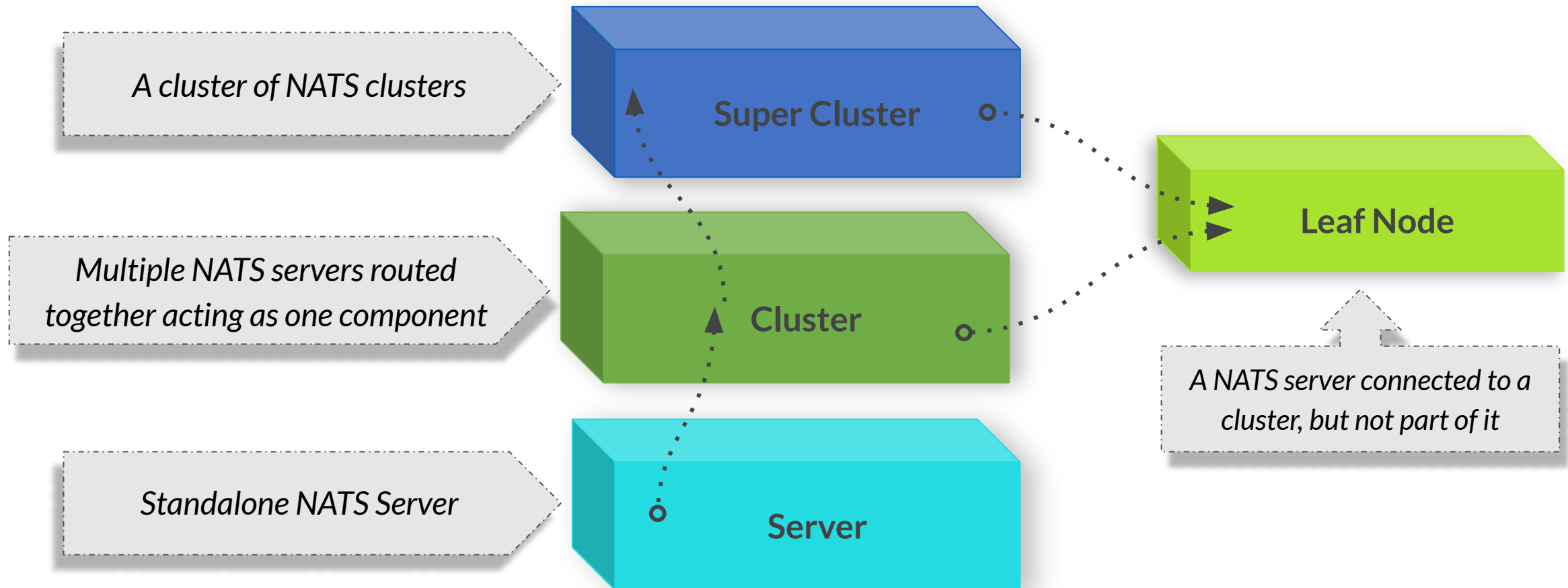
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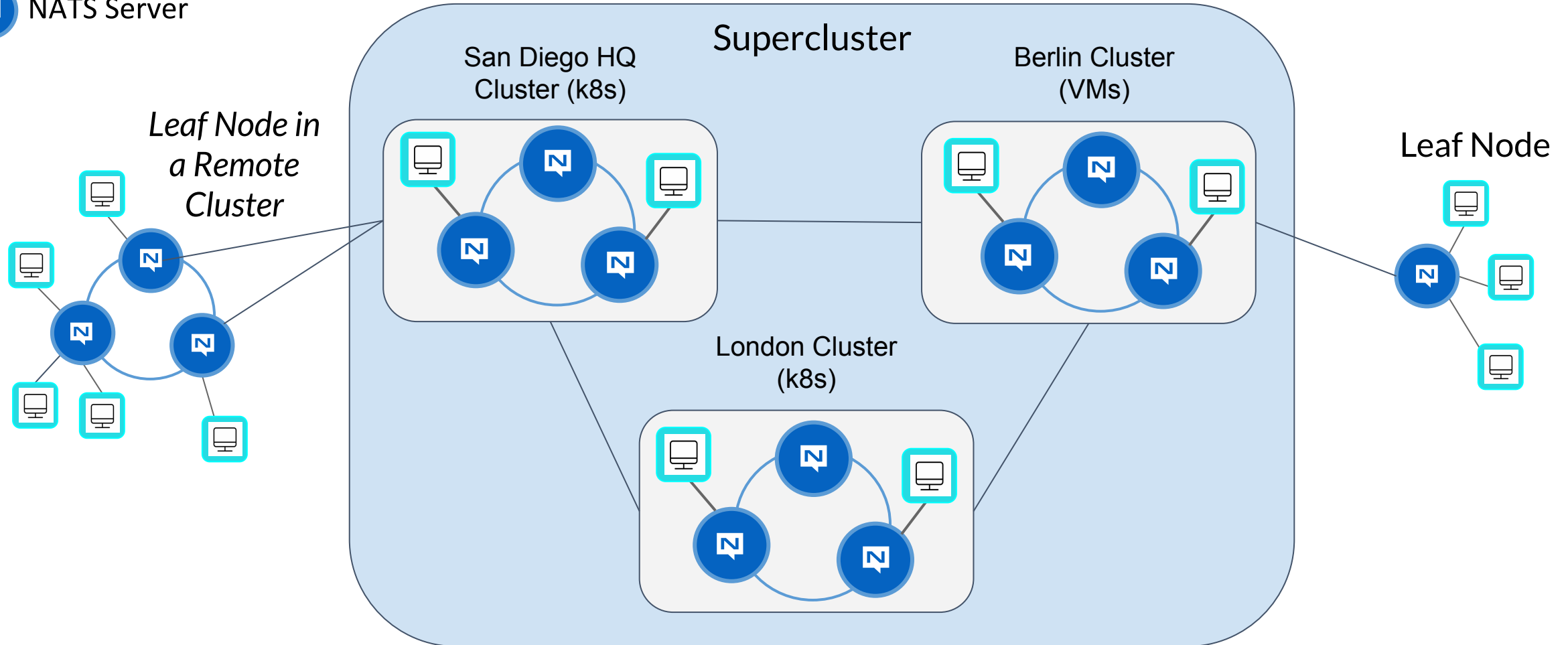
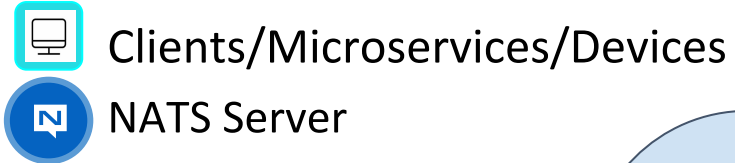
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Clients require **no awareness** of server topology beyond a connection URL.

NATS Adaptive Edge Architecture



Demo: nats.chat

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Demo: Streams



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A screenshot of a chat application interface. On the left is a sidebar with two sections: "CHANNELS" and "DIRECT MESSAGES". Under "CHANNELS", there are three items: "KUBECON" (highlighted with a green bar), "NATS", and "General". Under "DIRECT MESSAGES", there are two items: "userb" and "usera" (which has a green dot next to it). The main chat area on the right is dark blue. It contains three white annotations: an arrow pointing to the top right corner with the text "chat.KUBECON.posts.*", an arrow pointing to the "usera" item in the sidebar with the text "chat.KUBECON.dms.*", and the text "chat.KUBECON.online" in the center. At the bottom of the chat area, there is a message: "05:13 <userb> Welcome to KubeCon 2020!". Below the message is a text input field with a small cursor icon on the left.

CHANNELS

- KUBECON
- NATS
- General

DIRECT MESSAGES

- userb
- usera ●

chat.KUBECON.posts.*

chat.KUBECON.dms.*

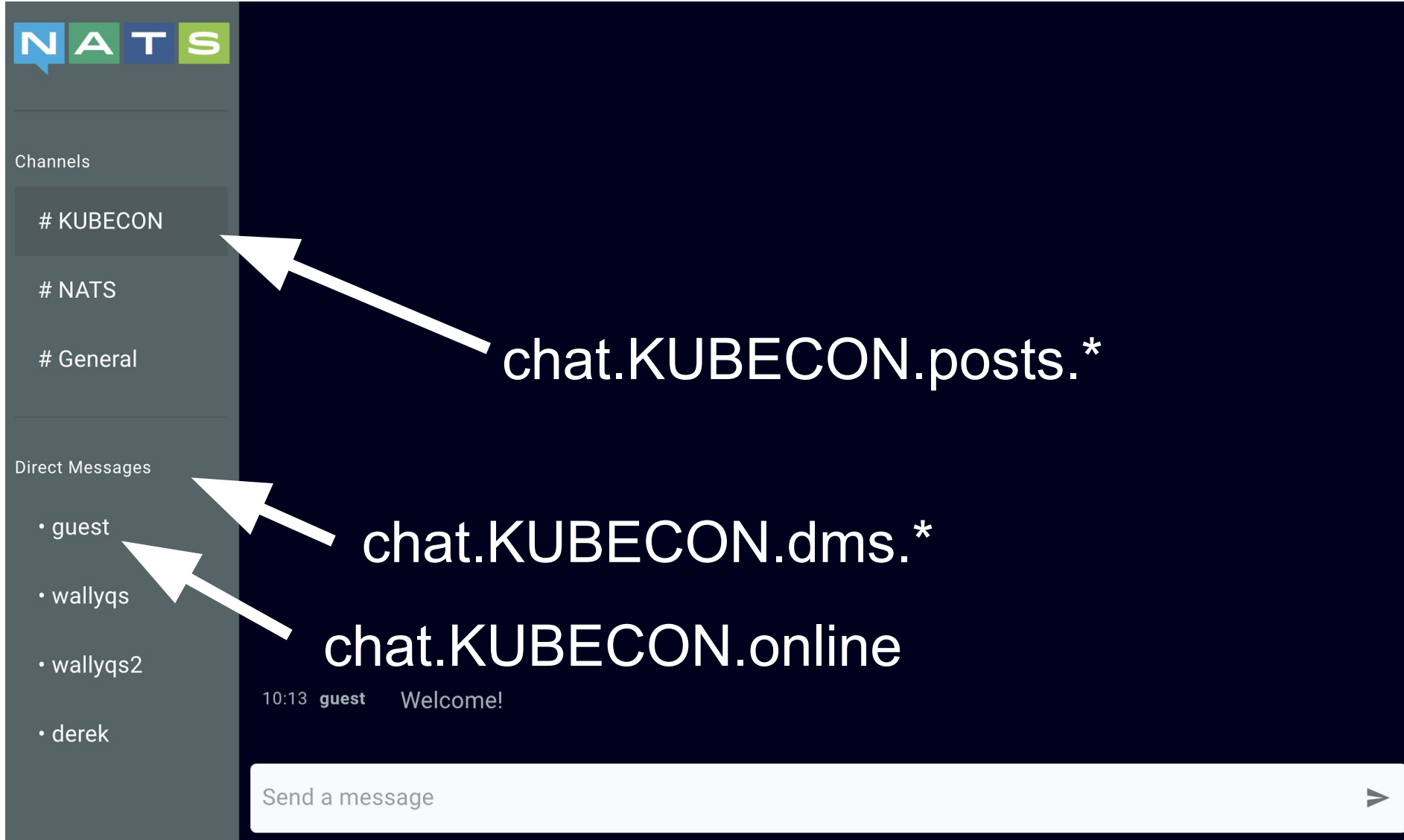
chat.KUBECON.online

05:13 <userb> Welcome to KubeCon 2020!

Demo: Streams over Websockets



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The screenshot shows a NATS chat interface. On the left, there is a sidebar with a 'Channels' section containing '# KUBECON', '# NATS', and '# General', and a 'Direct Messages' section containing '• guest', '• wallyqs', '• wallyqs2', and '• derek'. The main chat area is dark blue. Three white arrows point from text labels to the interface: one from 'chat.KUBECON.posts.*' to the '# KUBECON' channel, one from 'chat.KUBECON.dms.*' to the '• guest' direct message, and one from 'chat.KUBECON.online' to the '• wallyqs' direct message. At the bottom of the chat area, there is a message: '10:13 guest Welcome!' and a text input field with the placeholder 'Send a message' and a send button.

NATS

Channels

- # KUBECON
- # NATS
- # General

Direct Messages

- guest
- wallyqs
- wallyqs2
- derek

chat.KUBECON.posts.*

chat.KUBECON.dms.*

chat.KUBECON.online

10:13 guest Welcome!

Send a message

Demo: Services



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To get access to the Chat Streams, first need to request for credentials.

SERVICE: chat.req.access



Register a username to join the party!



Username

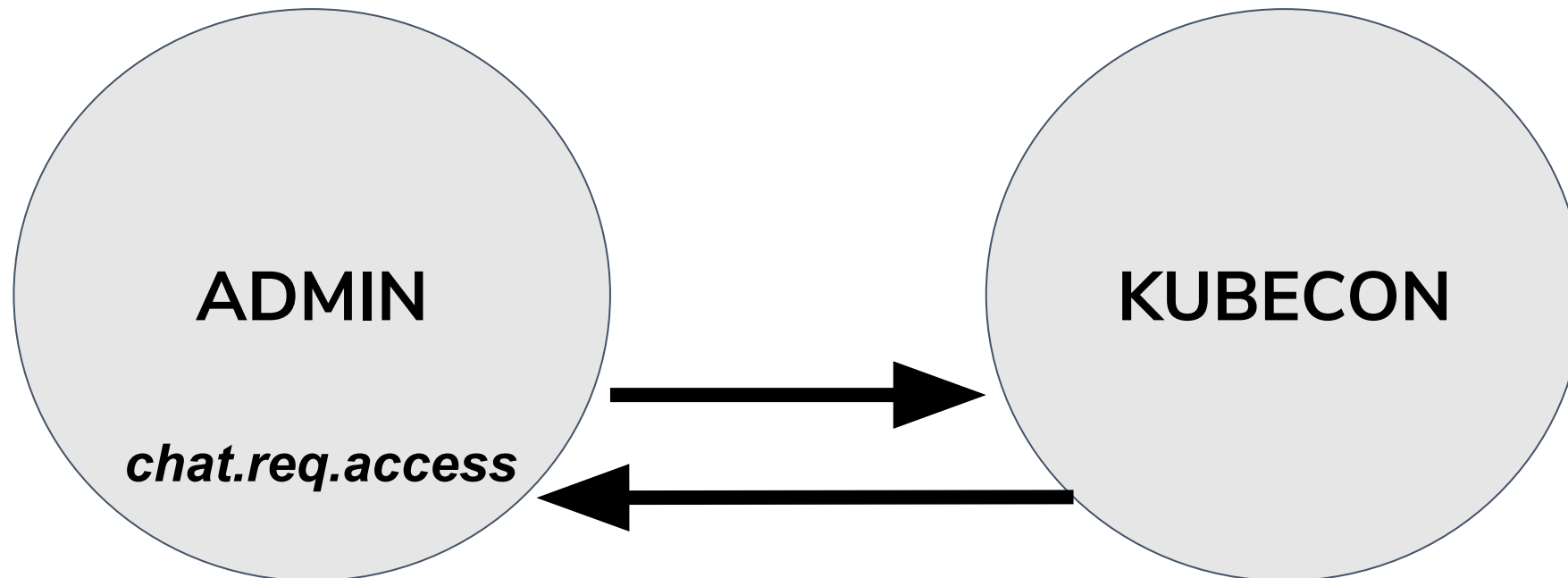
jaime

REGISTER

Demo: Accounts

chat.KUBECON.posts.*

chat.KUBECON.dms.*



Demo: Services: Revoking Users



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Chat Admin

Please provide your NATS admin credentials below to continue.

Drag and drop a file here or click



Demo: Services: Revoking Users



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Chat Admin

celine

UDK7H0FMZRFW334ZV2R2GD7QBX4FHI5BH3E7N06QCY2WV2TJOMQZ4FOX

REVOKE

derek

UDRSLK6ZRR6CNFDHJPLEX7U2L2BLICSTTHDVZV53QSNWG6LZXS2ZRMNO

REVOKE

guest

UAOGN5MU6PKYGWTEFO2HS74T3GZZHFR2HPPKKQUQ6CHH3U42PX22UMRI

REVOKE

Questions?



<https://natsio.slack.com> ← Join the NATS community :)

github.com/nats-io / [@nats io](https://twitter.com/nats_io)

<https://nats.io>