LINKERD

MULTICLUSTER DEEP DIVE

ZAHARI DICHEV

AGENDA

- Service Mesh Overview
- Multicluster Concepts
- Architecture
- Demo
- The Life Of a Request Across Clusters
- Q&A

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SERVICE MESH OVERVIEW

“A and B can exchange packets”

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VS

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VS

“A and B can exchange packets in a way that validates the identity on both sides; has clear authorization semantics; is confidential to third parties; and is measurable and inspectable”

DISTRIBUTED SYSTEM

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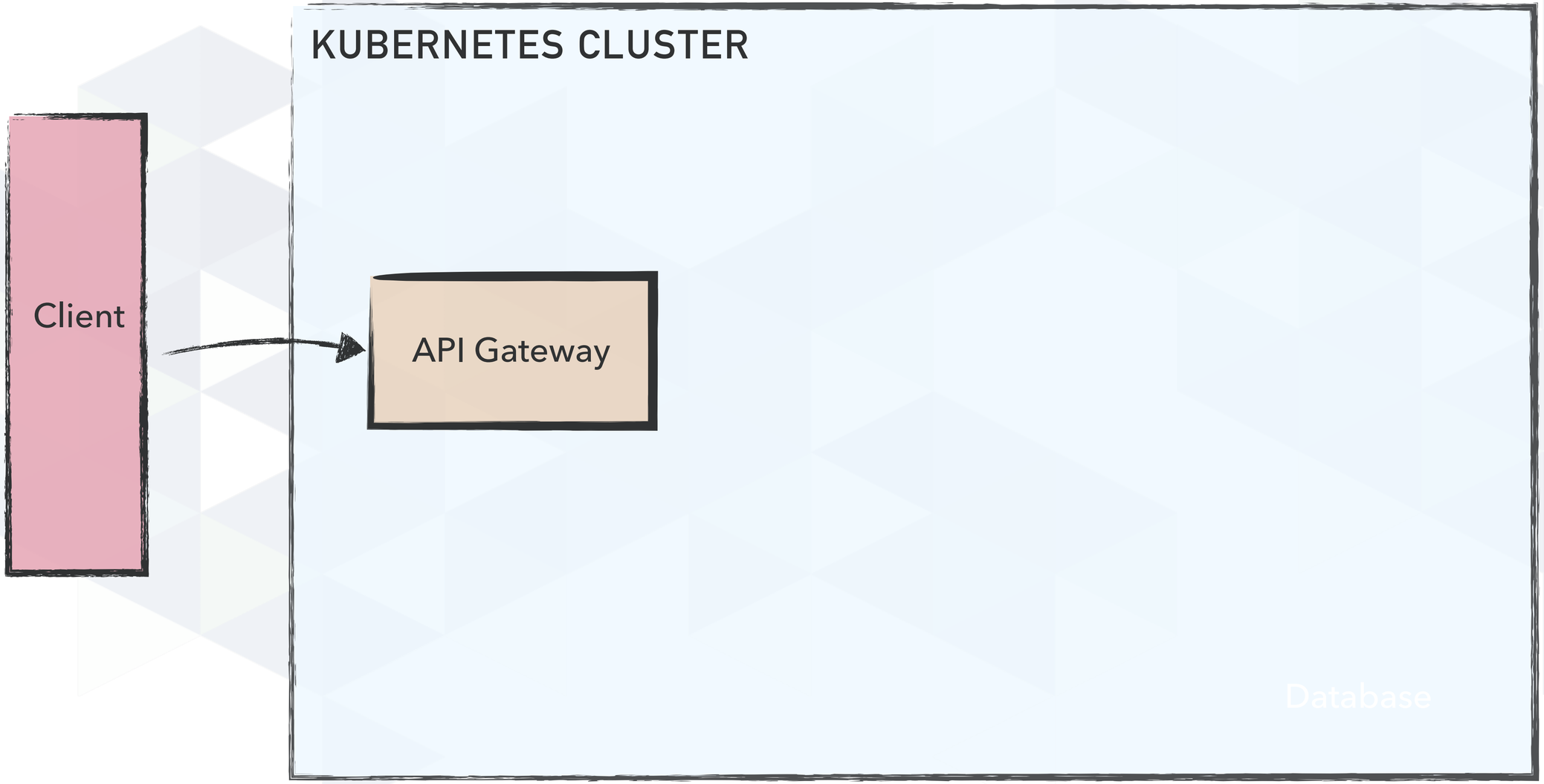

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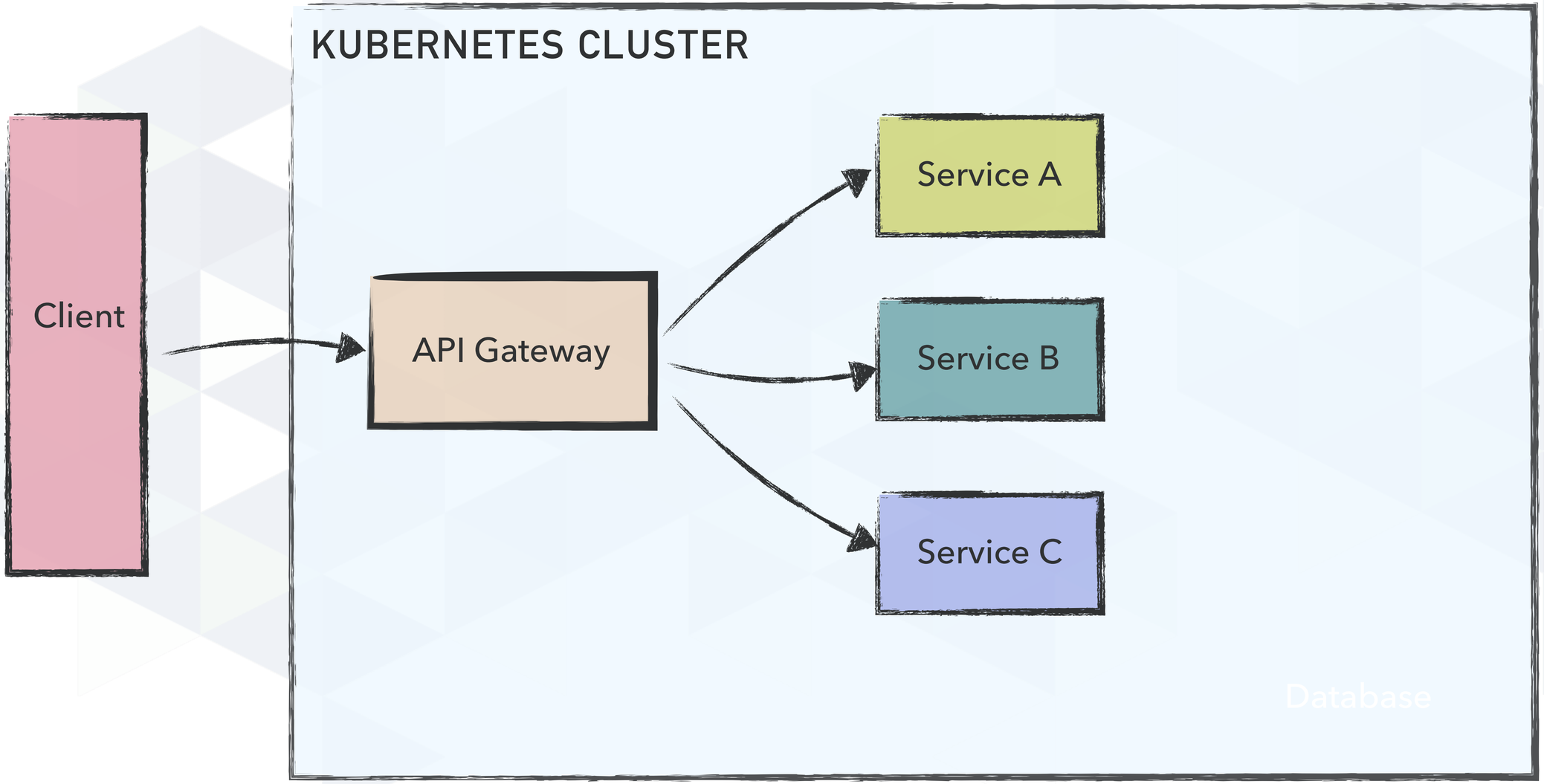

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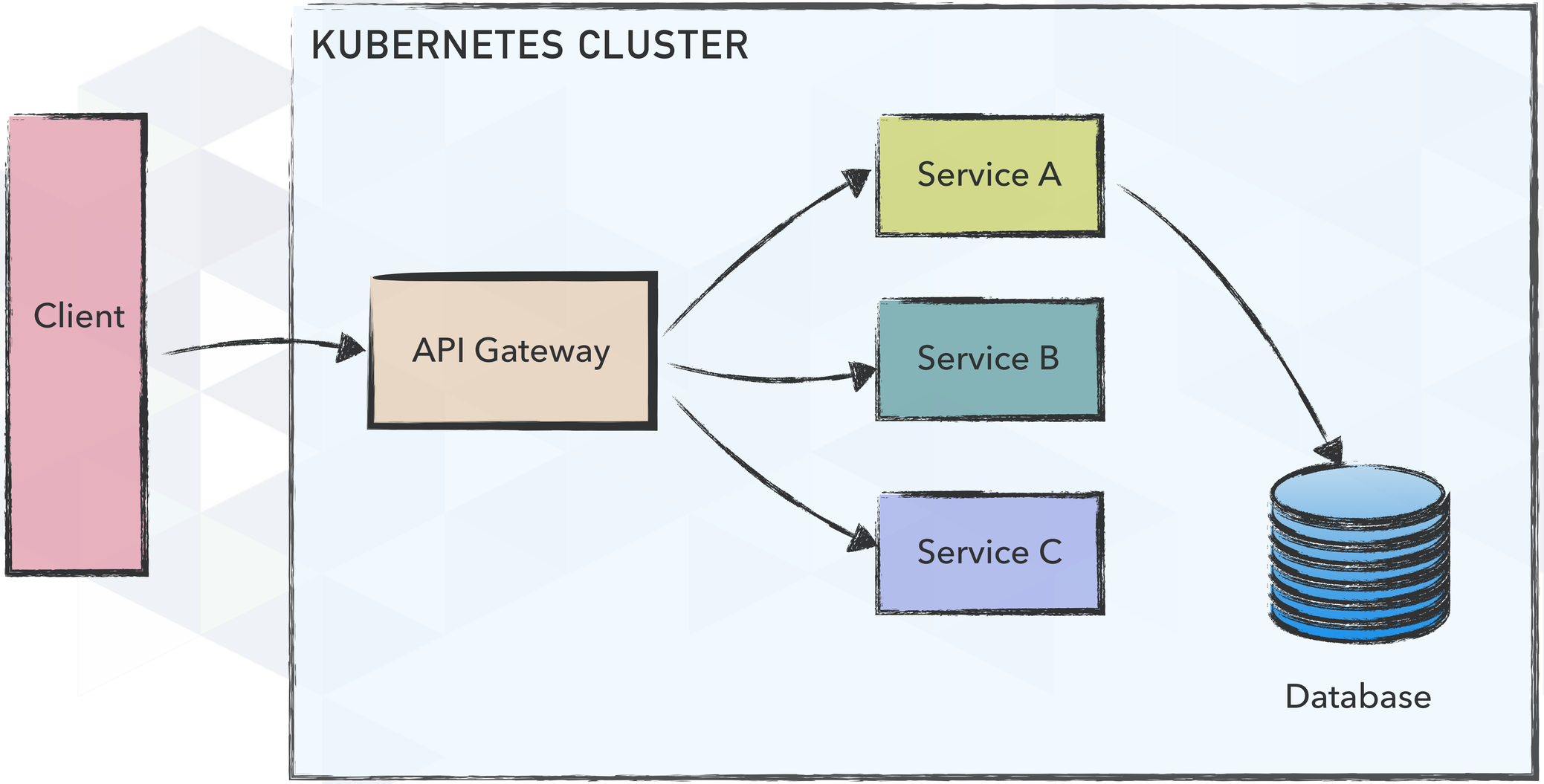

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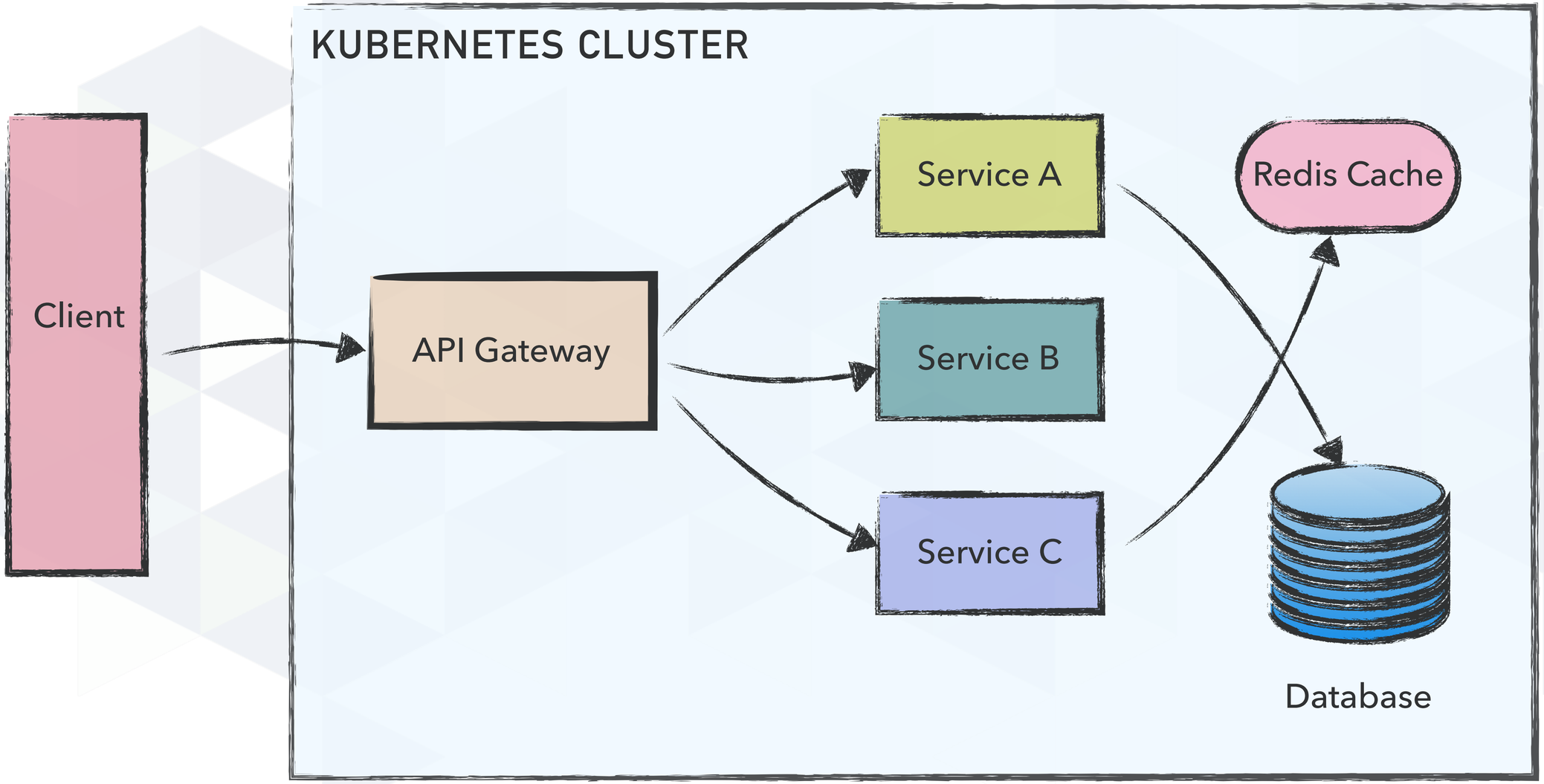

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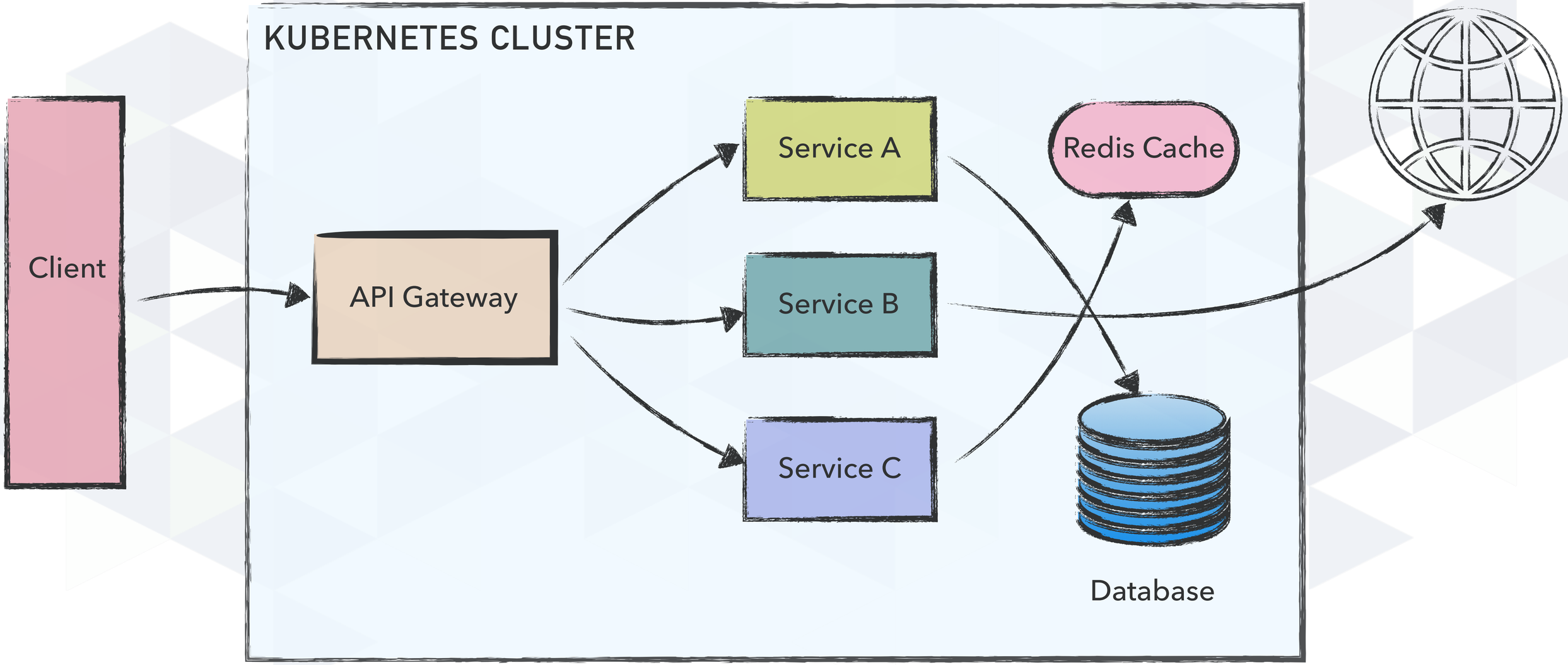

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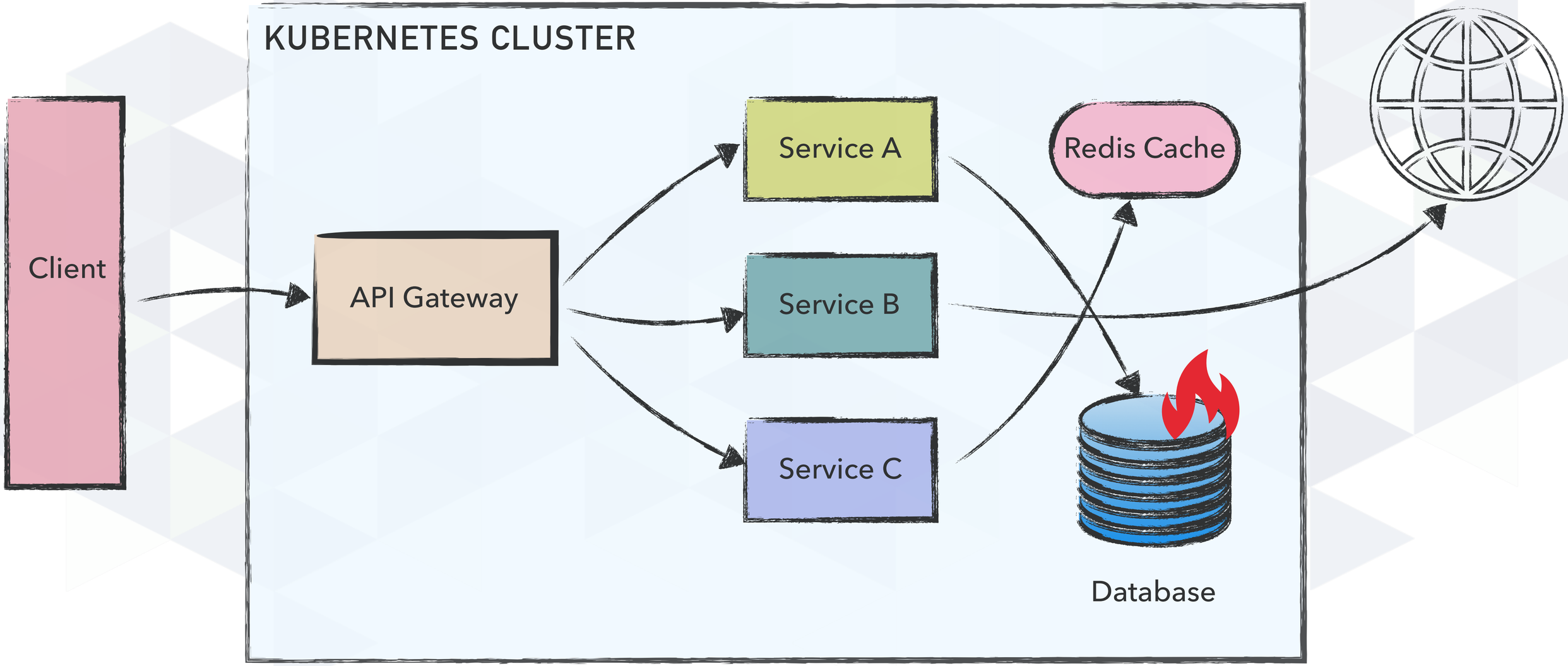

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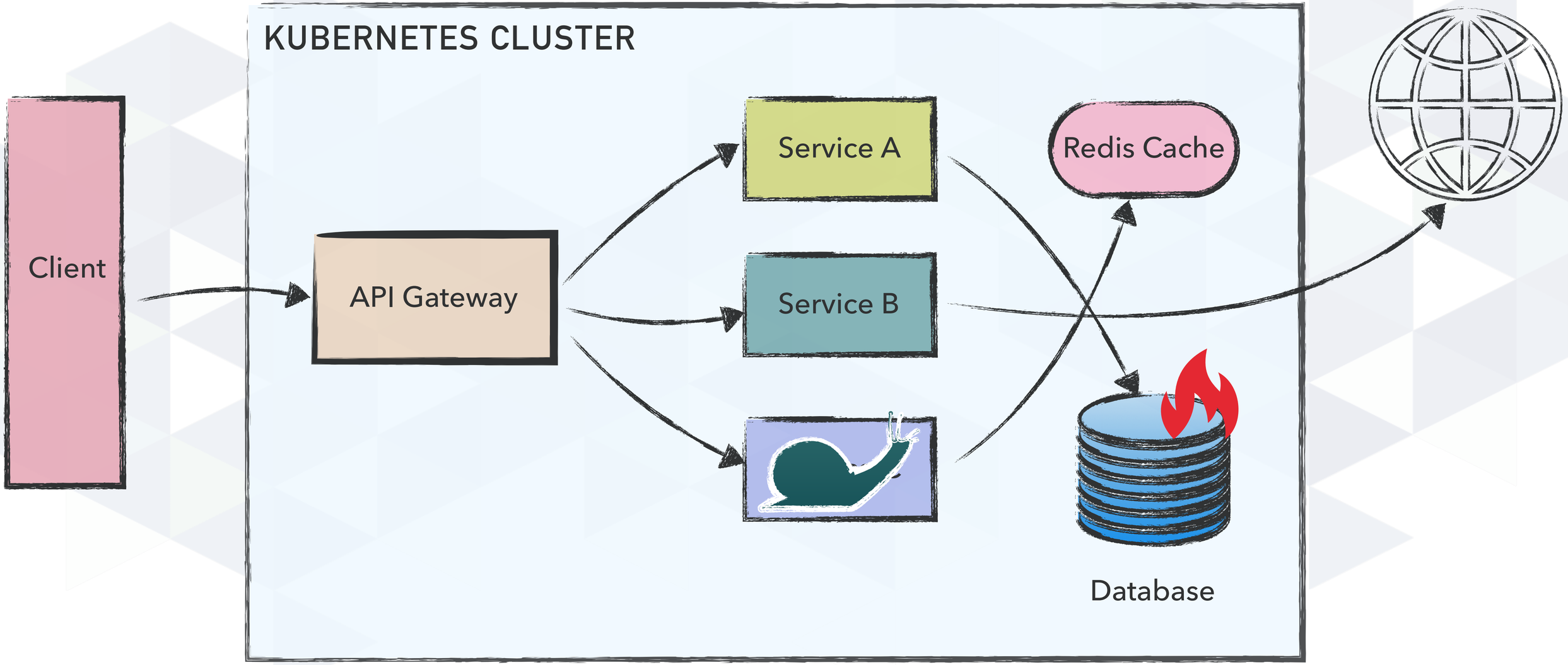

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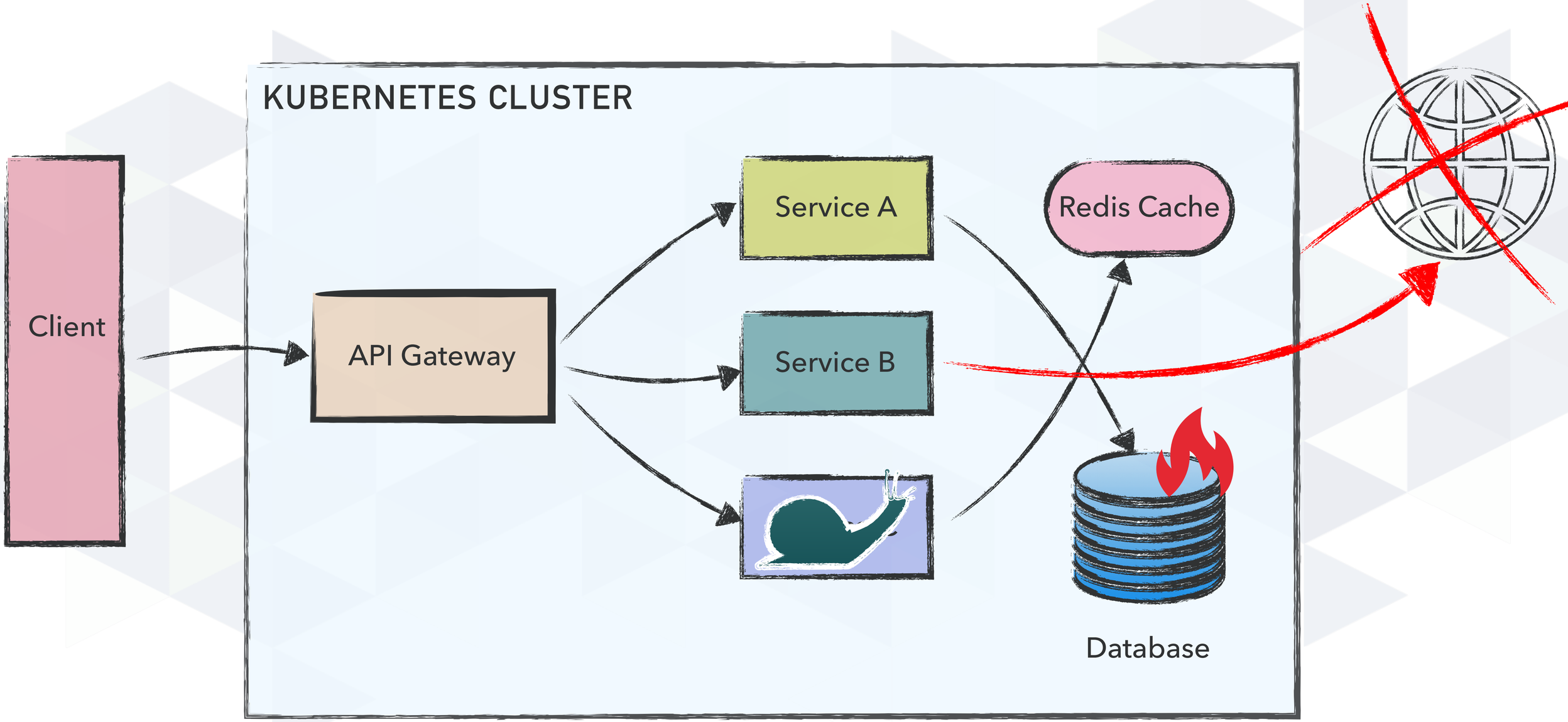

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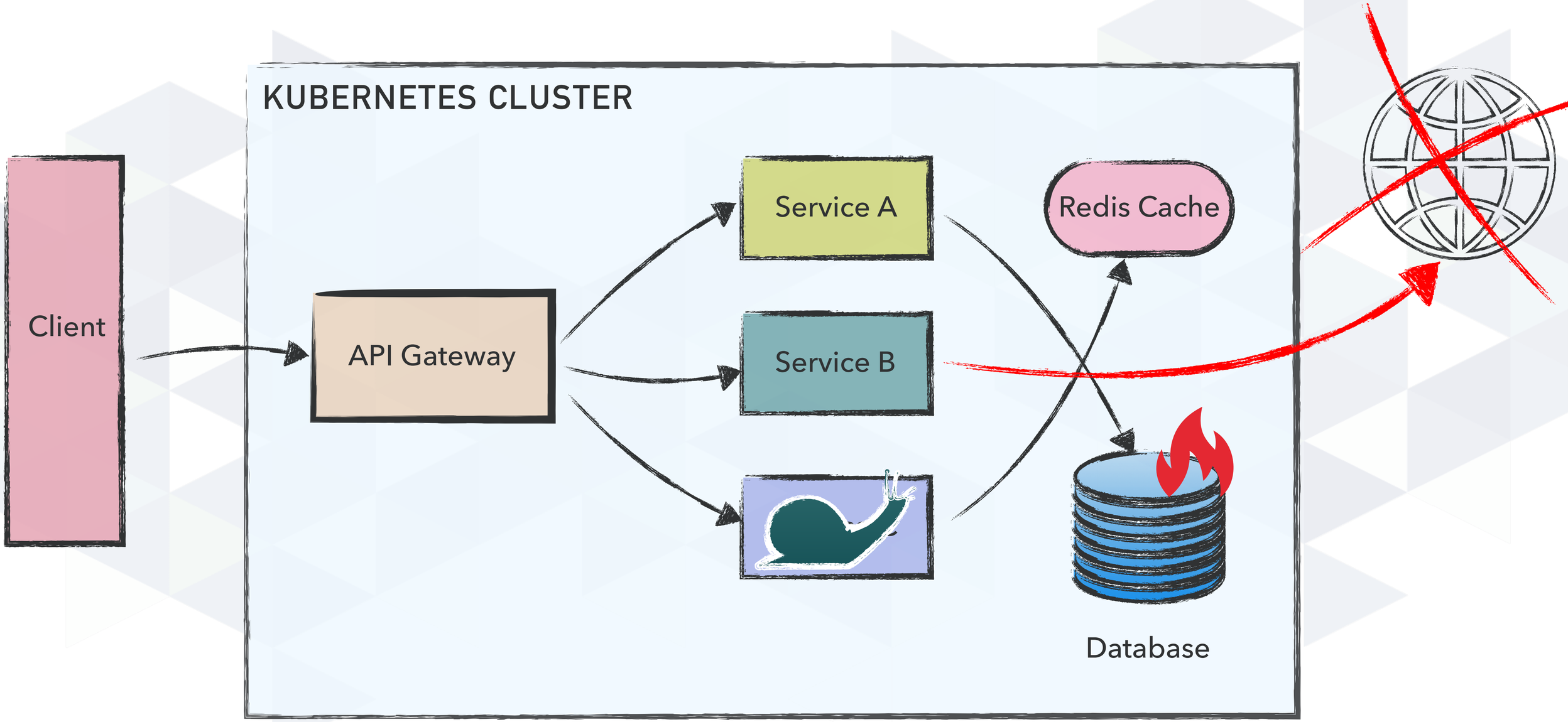

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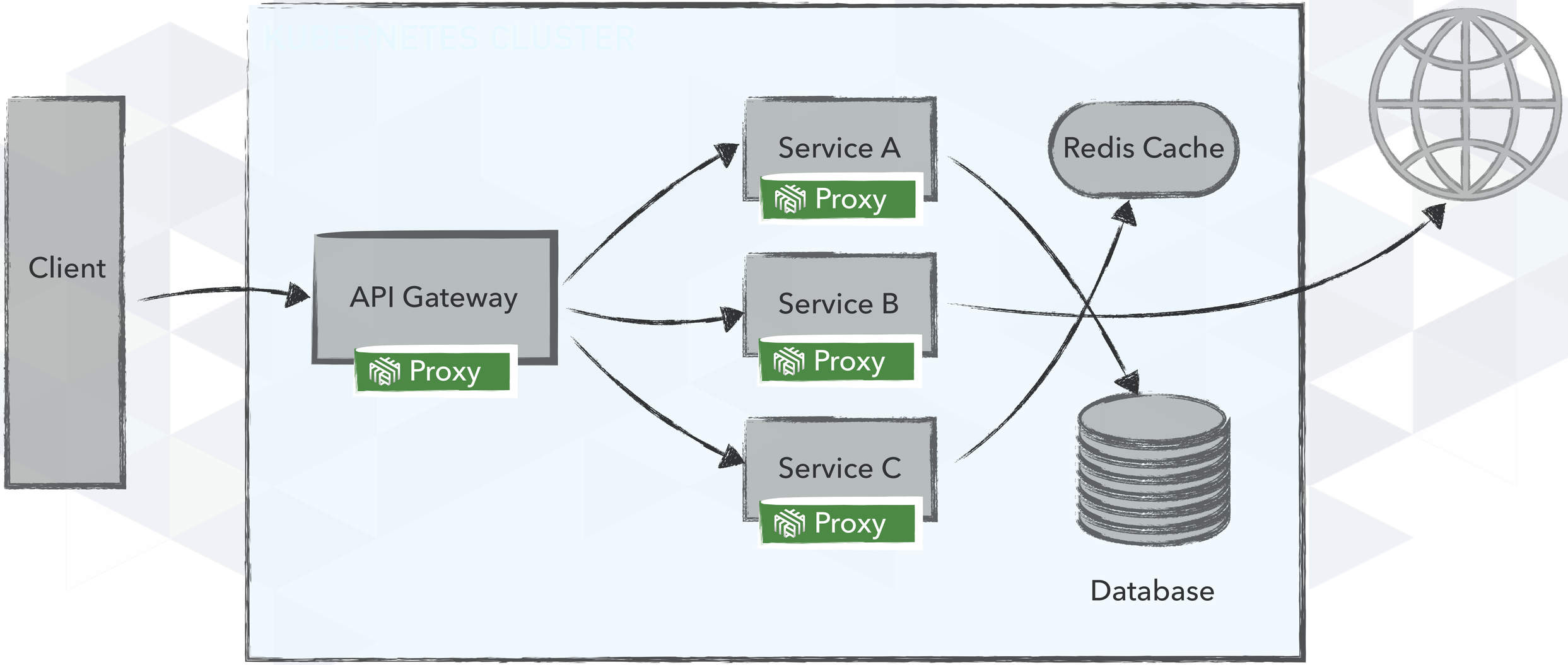

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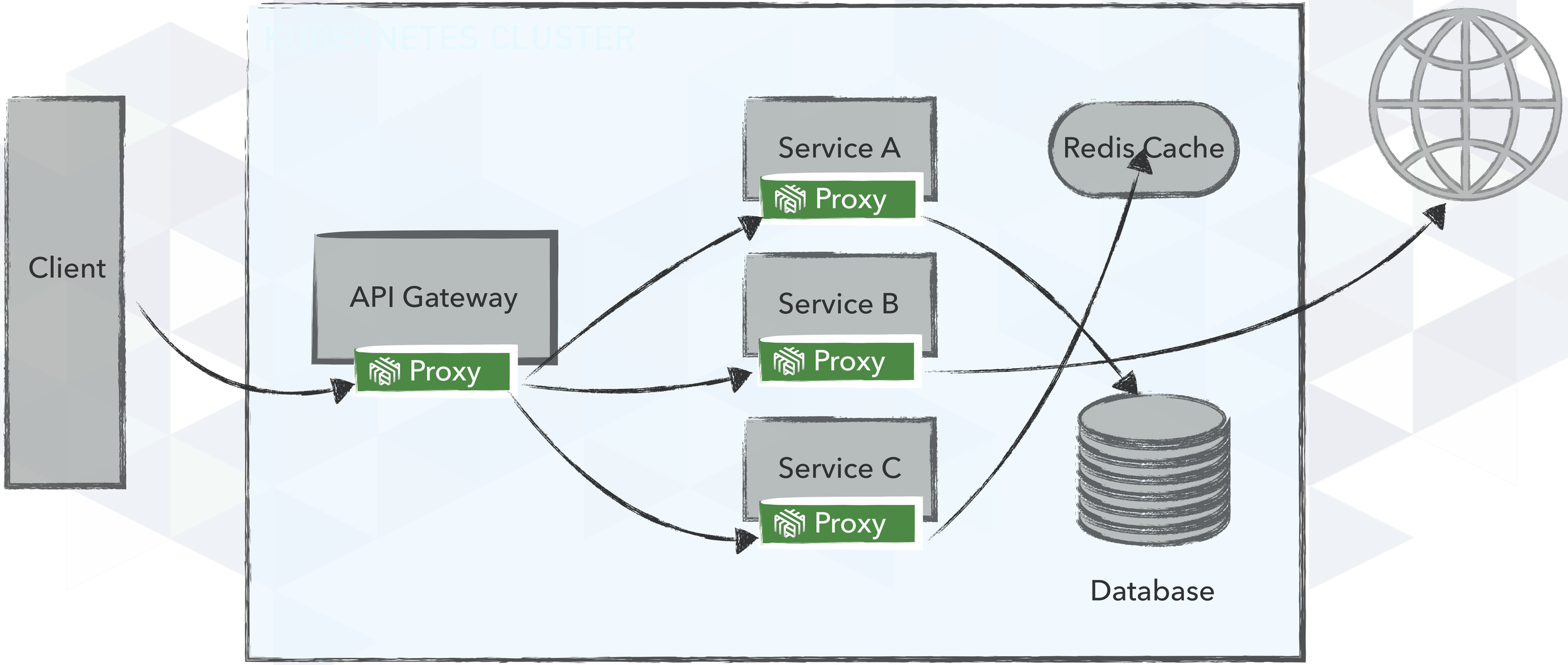

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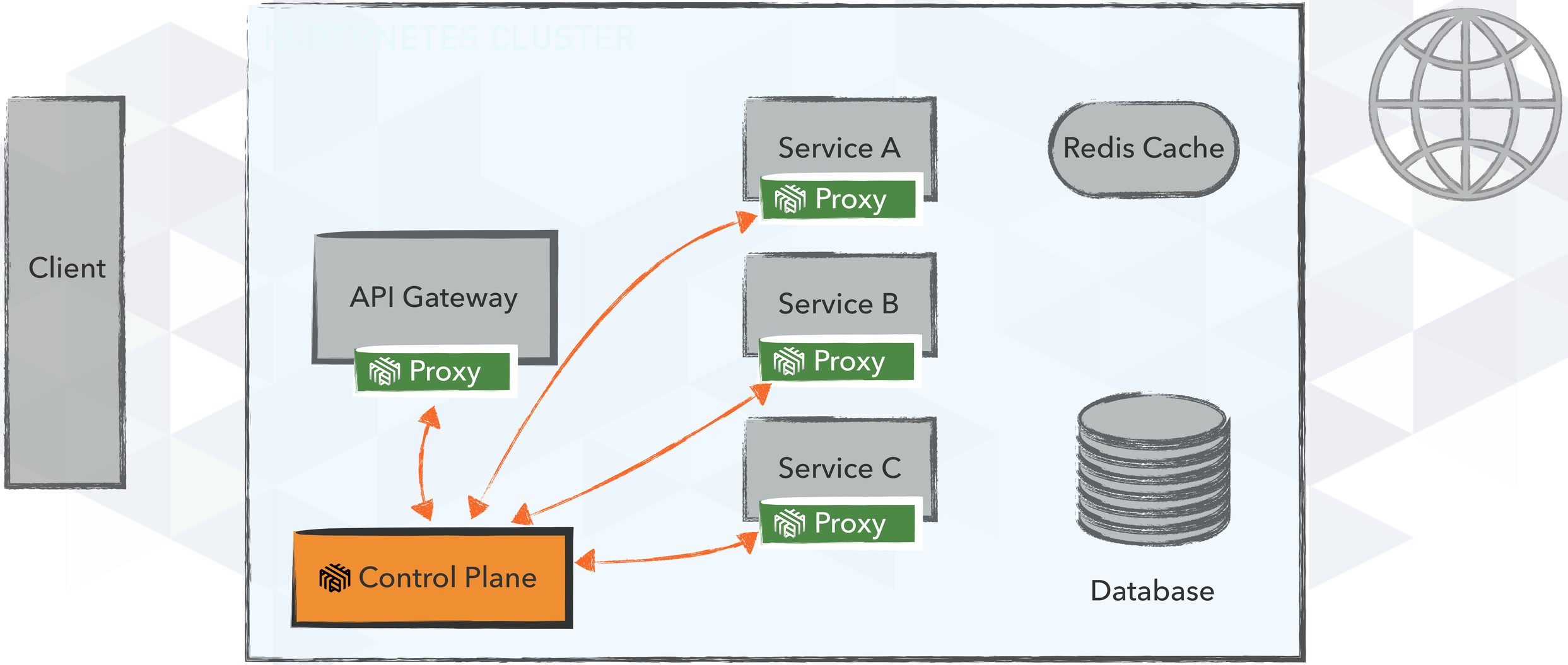


CONTROL PLANE

- TLS certificates for the proxy
- Service Discovery
- Service Profiles
- Automatic Proxy Injection
- Dashboard + Metrics
- API interface for CLI commands (tap, stat, etc…)

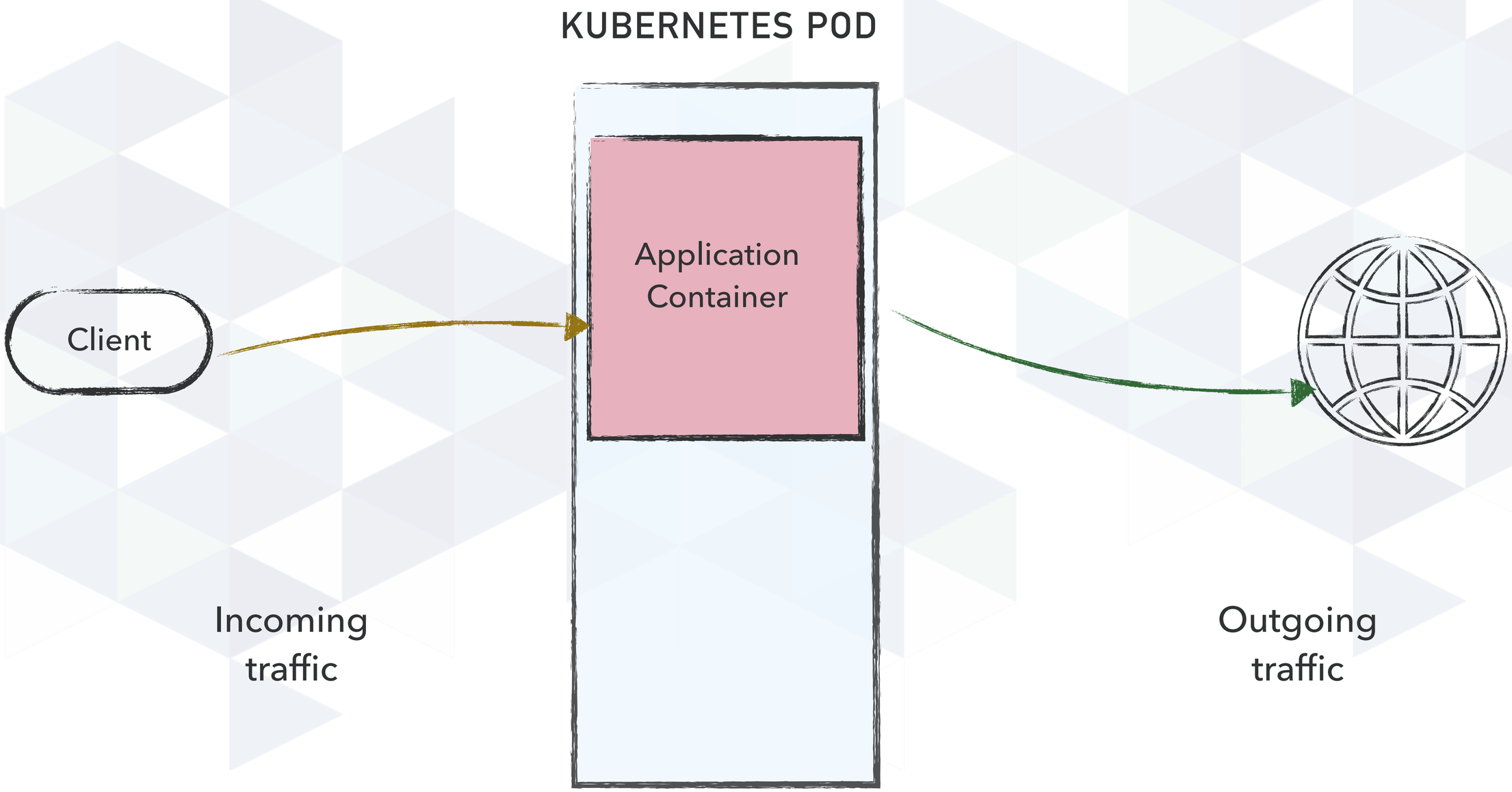
PROXY (DATA PLANE)

- Ultralight transparent proxy written in Rust
- Automatic Prometheus metrics export for HTTP and TCP traffic.
- Latency-aware, layer-7 load balancing
- Automatic TLS
- An on-demand diagnostic tap API

INJECTION

- Usually accomplished by the proxy-injector component
- Can be automatic or manual
- An init container added, which setups iptables rules for the pod
- A container that runs the proxy, intercepting traffic

INJECTION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Application Container
Client
Incoming traffic
Outgoing traffic

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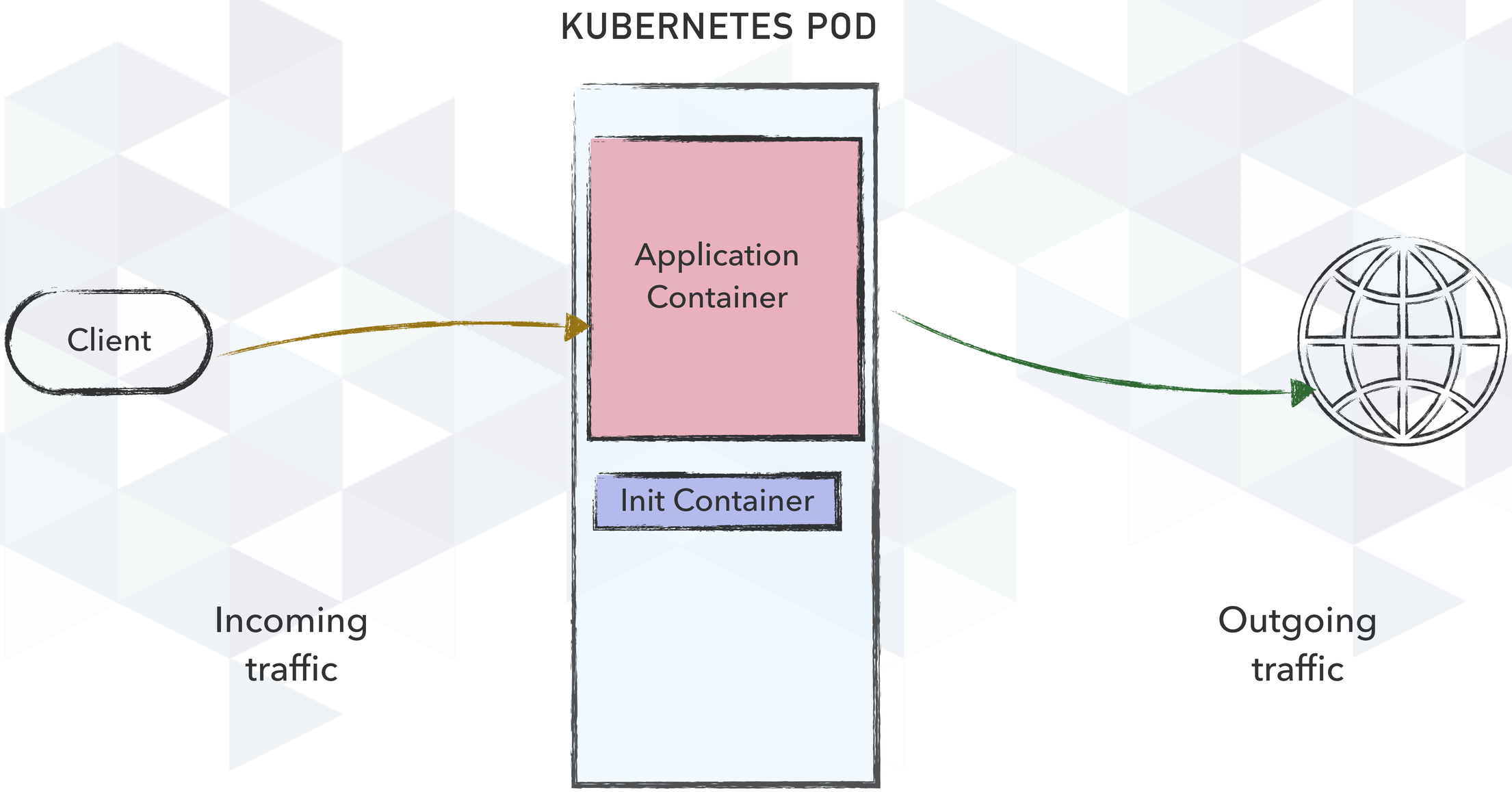
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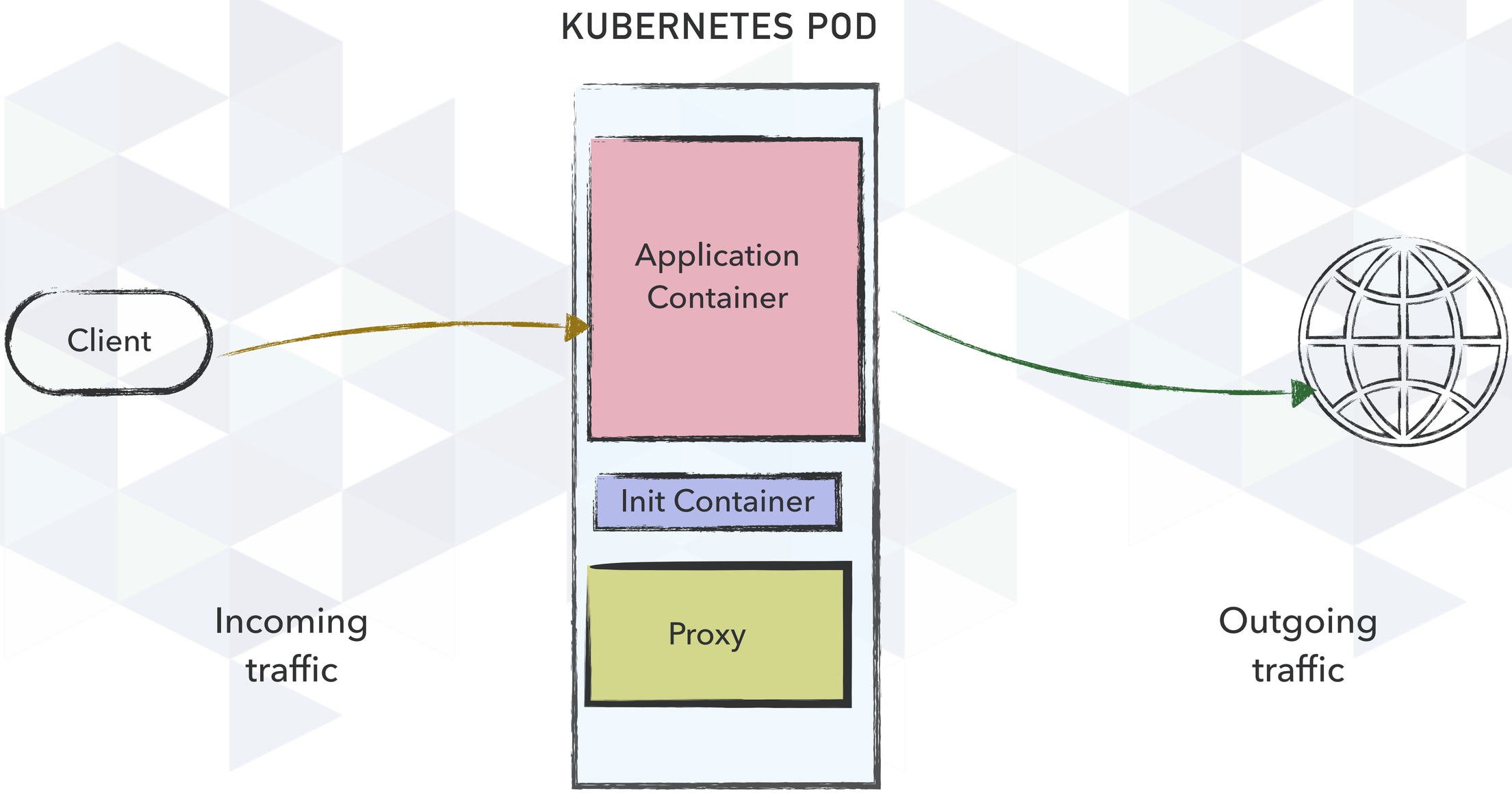
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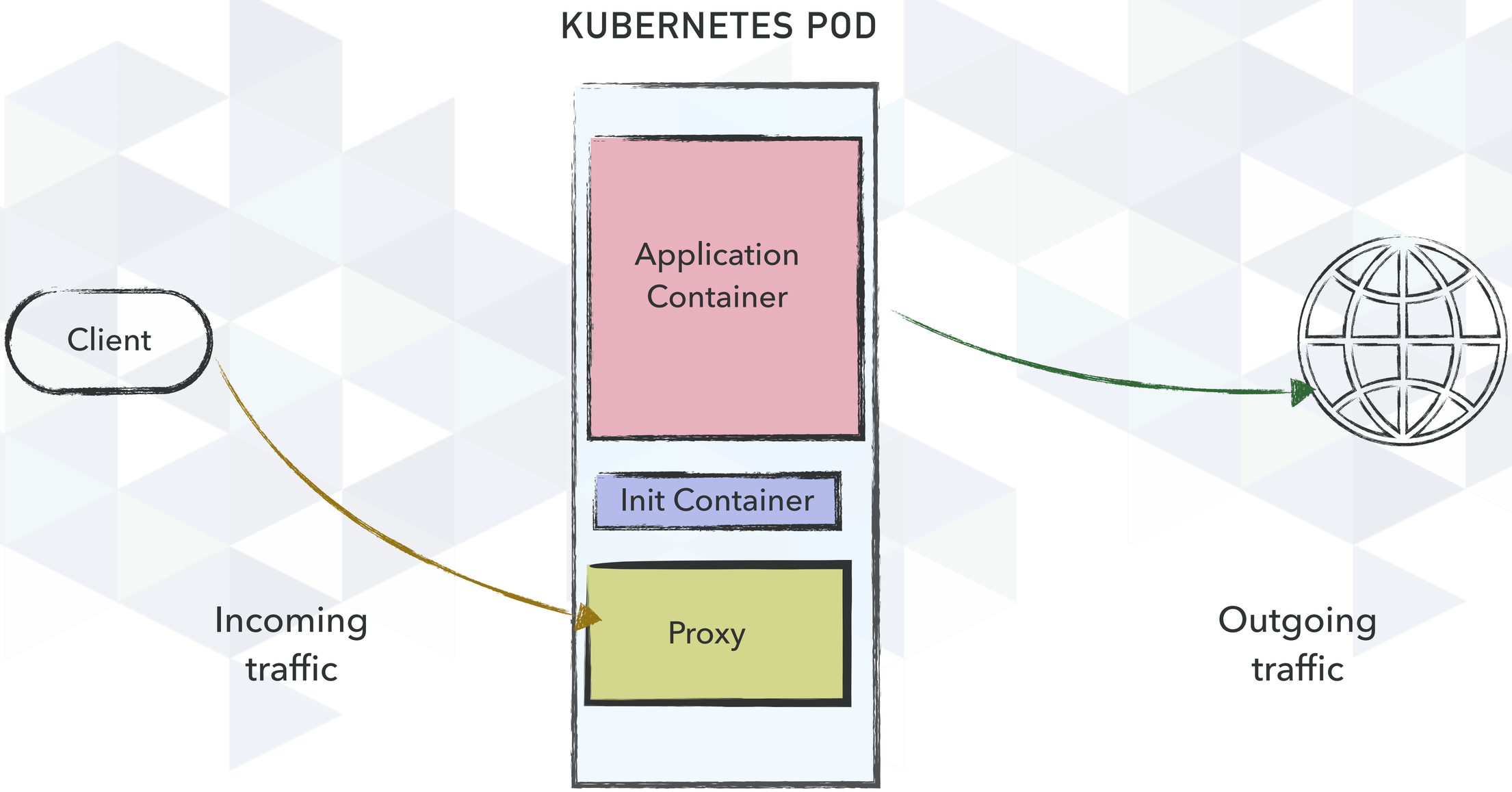
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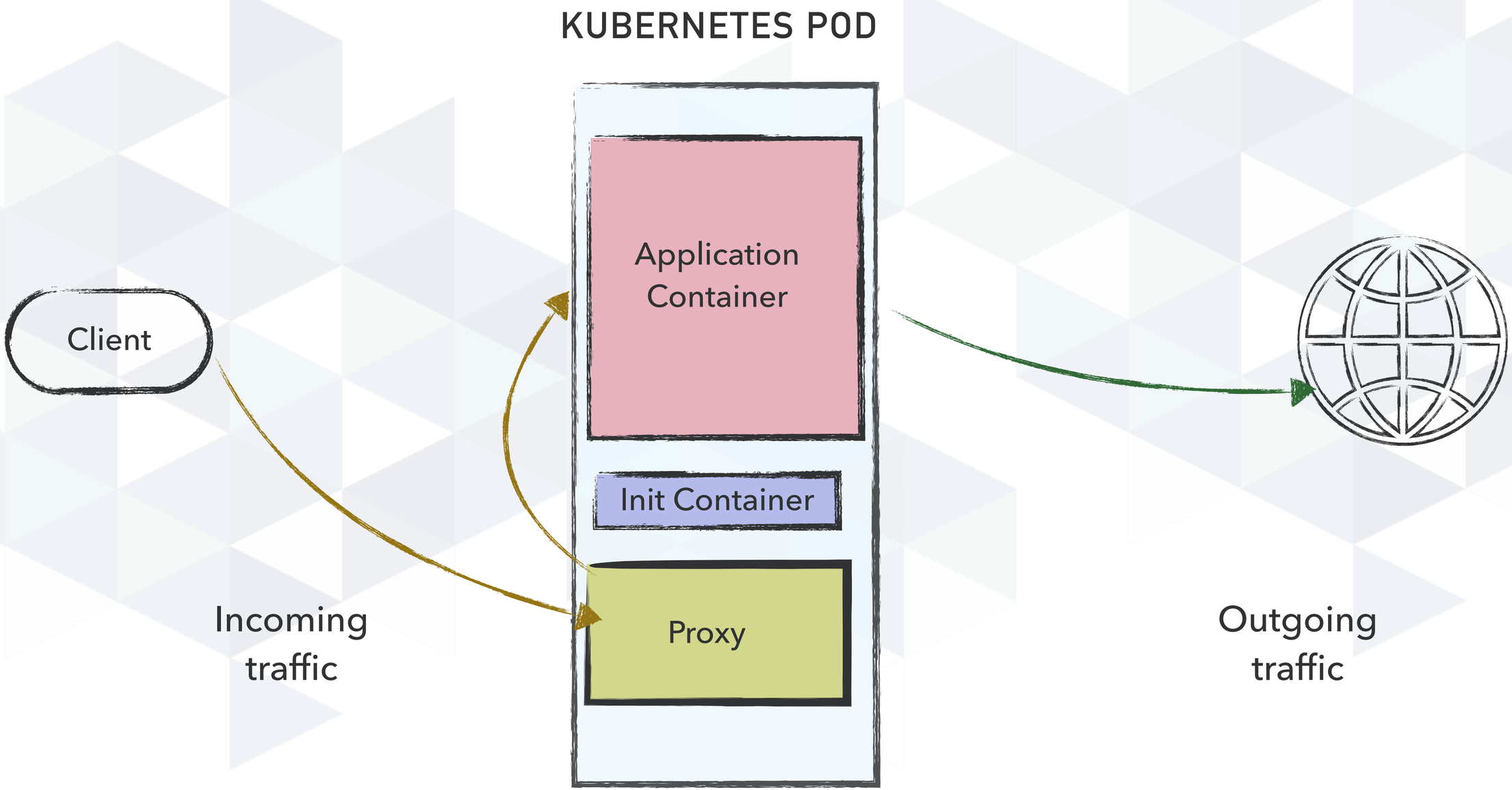
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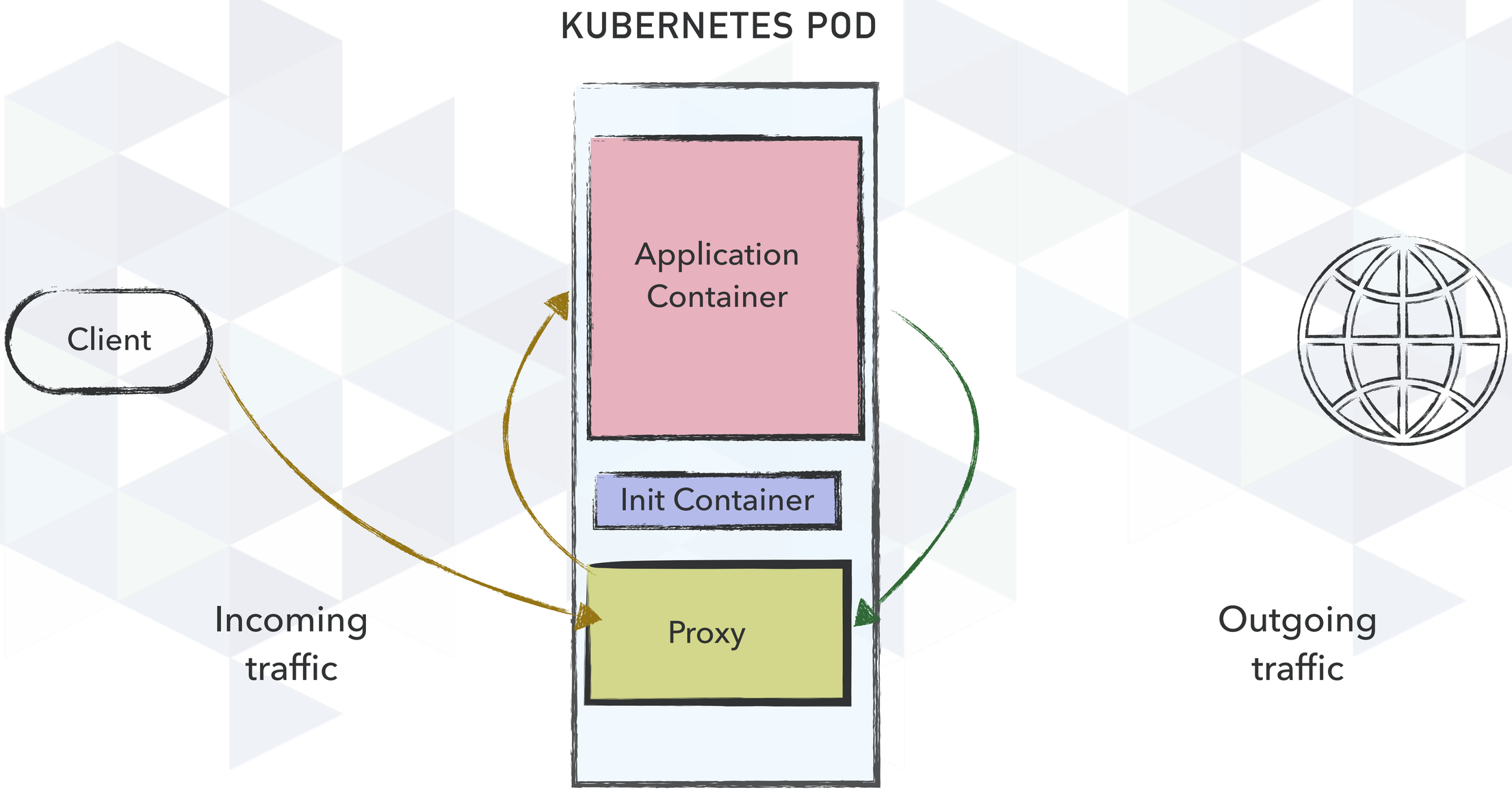
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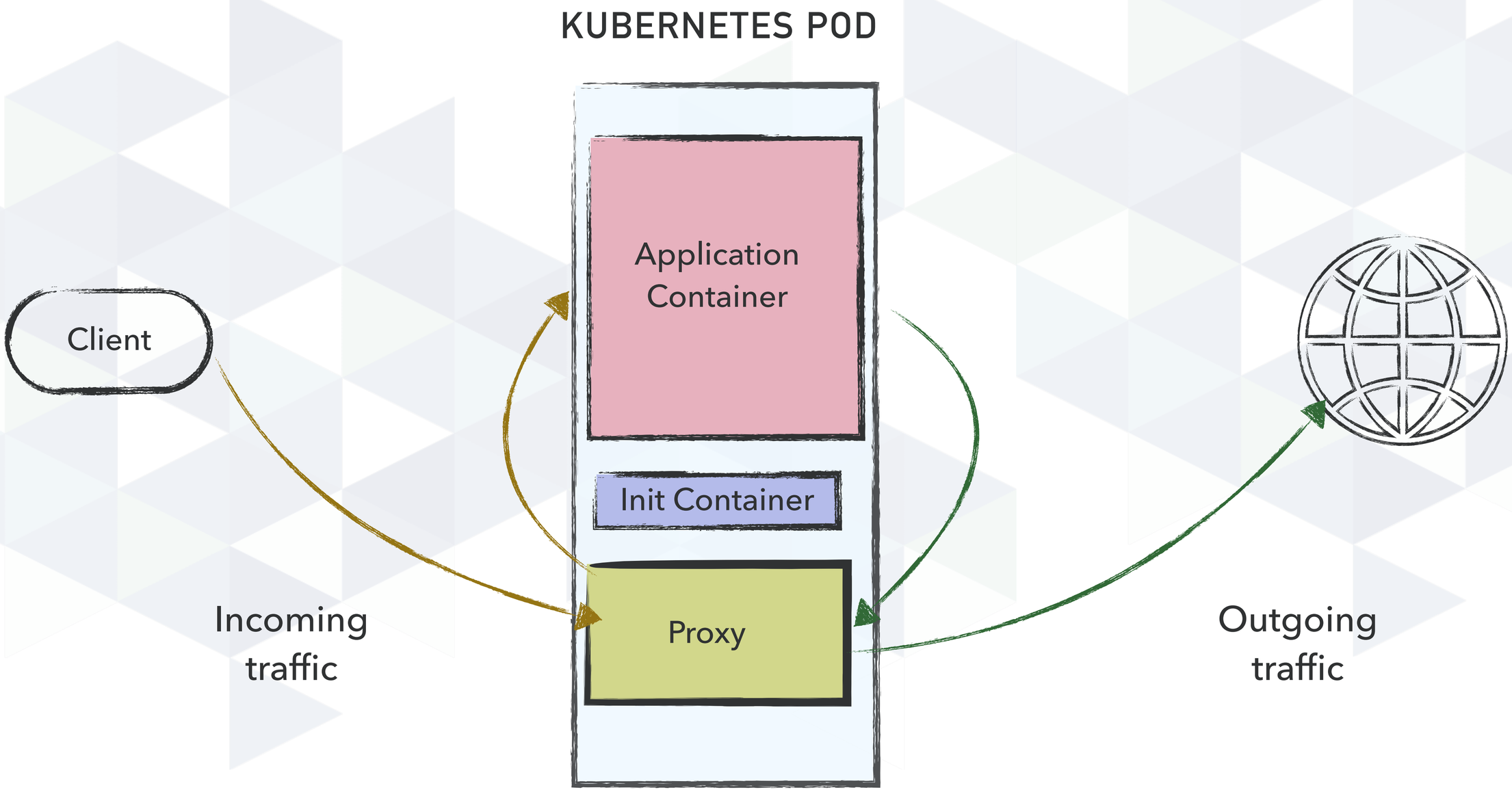
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CORE CONCEPTS

- Observability: Collecting actionable traffic metrics
- Security: Encrypting traffic between services
- Reliability: Ensuring services are available
- Traffic Management: Routing traffic to services

MULTICLUSTER DEEPDIVE

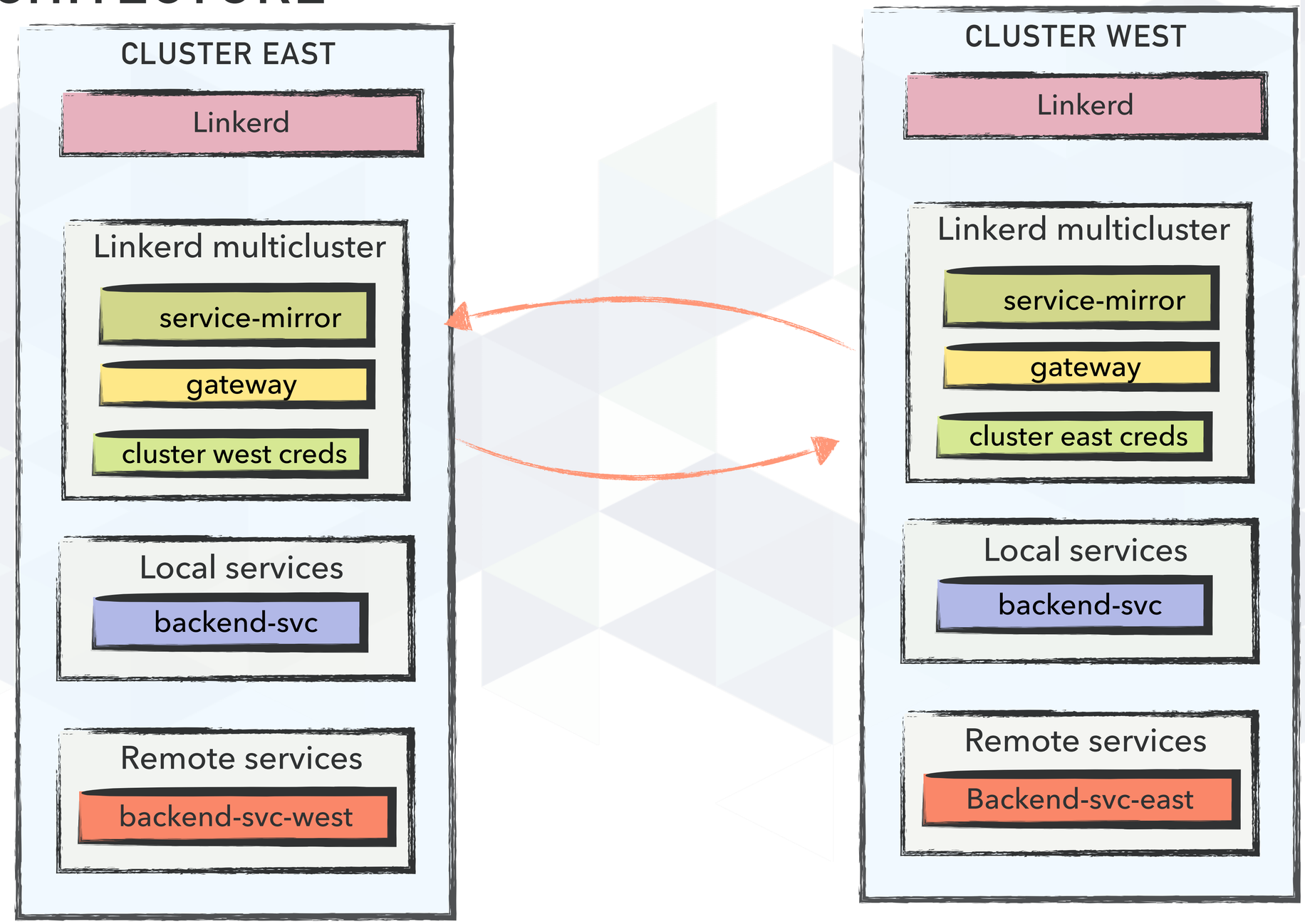
WHY MULTIPLE CLUSTERS ?

- Traffic Migration
- Canary Deployments
- Different Environments
- Failover

CORE CONCEPTS

- **Secure**: everything happens over mTLS
- **Kubernetes-first:** remote services should appear as K8s services
- **No SPOF:** no single cluster is blessed or magical
- **Transparent:** applications do not need to know whether a service is remote or local
- **Network independent:** only requirement is gateway connectivity

ARCHITECTURE



ARCHITECTURE

- Service mirror - monitors the exported state of the target cluster and replicating it
- Gateway - responsible for routing incoming traffic to the appropriate target services
- Credentials - service account (target cluster) and a secret containing k8s api config (source cluster)

DEMO TIME

- Two clusters - east and west
- Each have a backend-svc installed
- A test client deployed on cluster east
- We want to split the traffic to backend-svc between east and west

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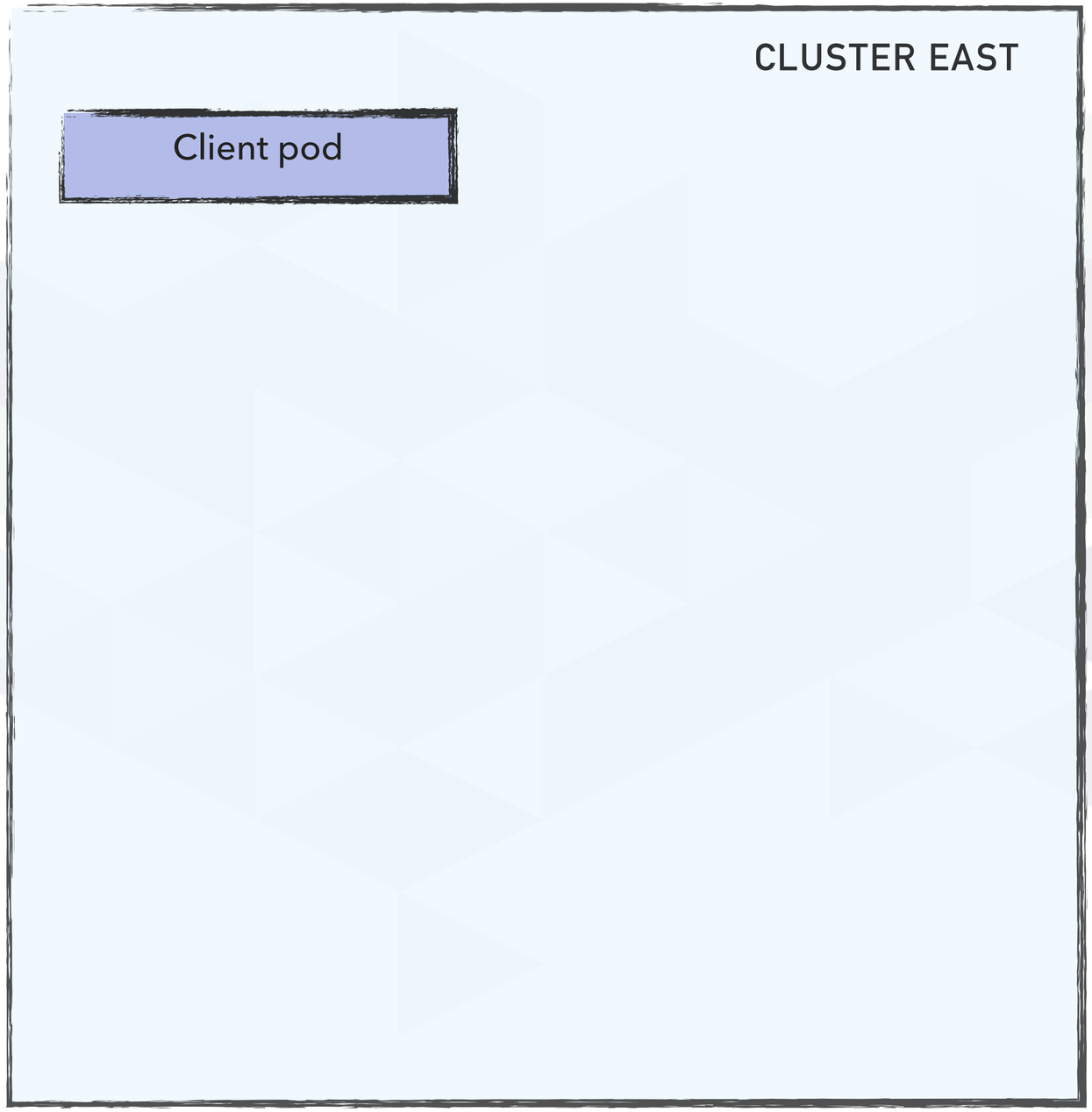

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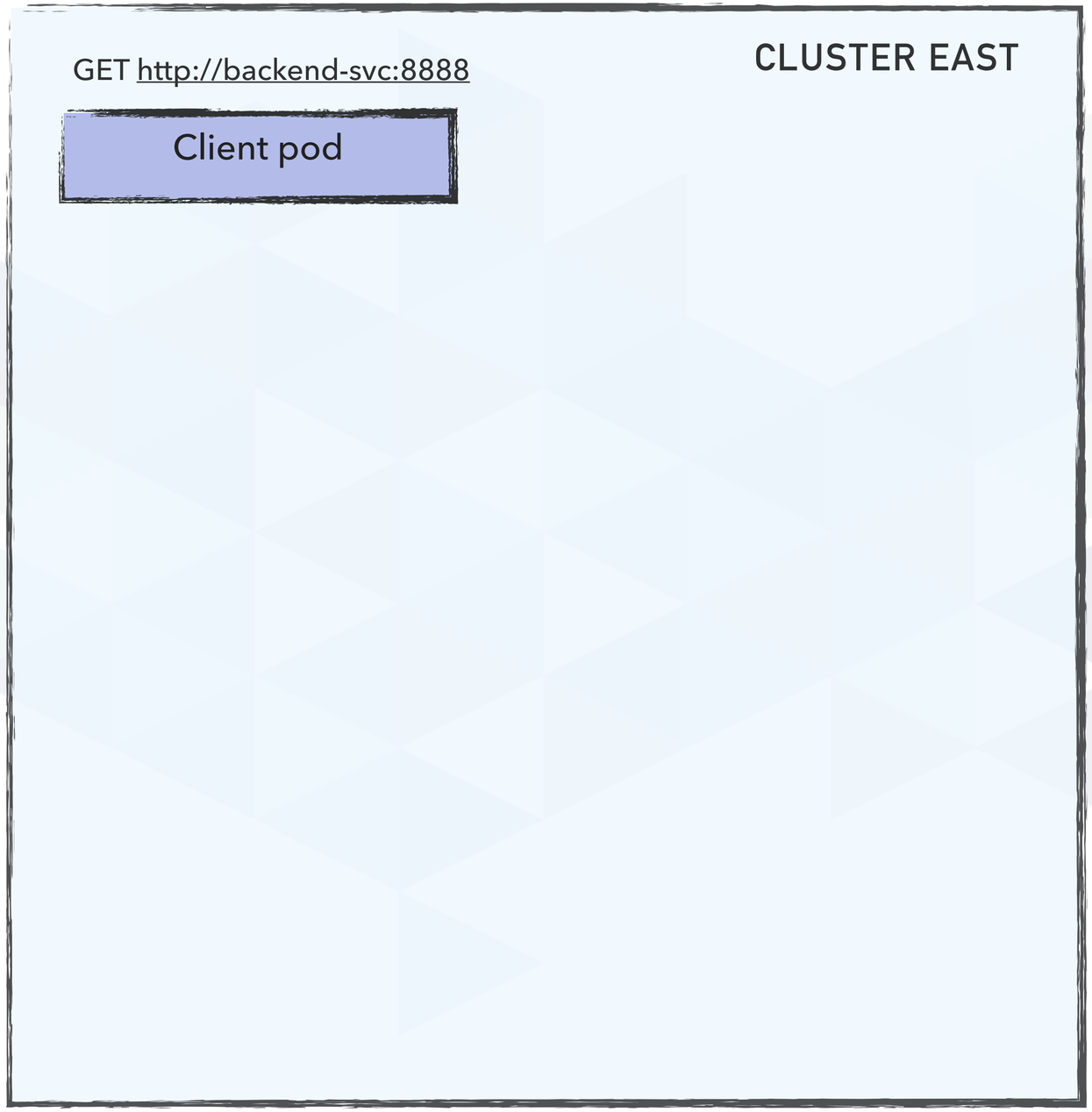

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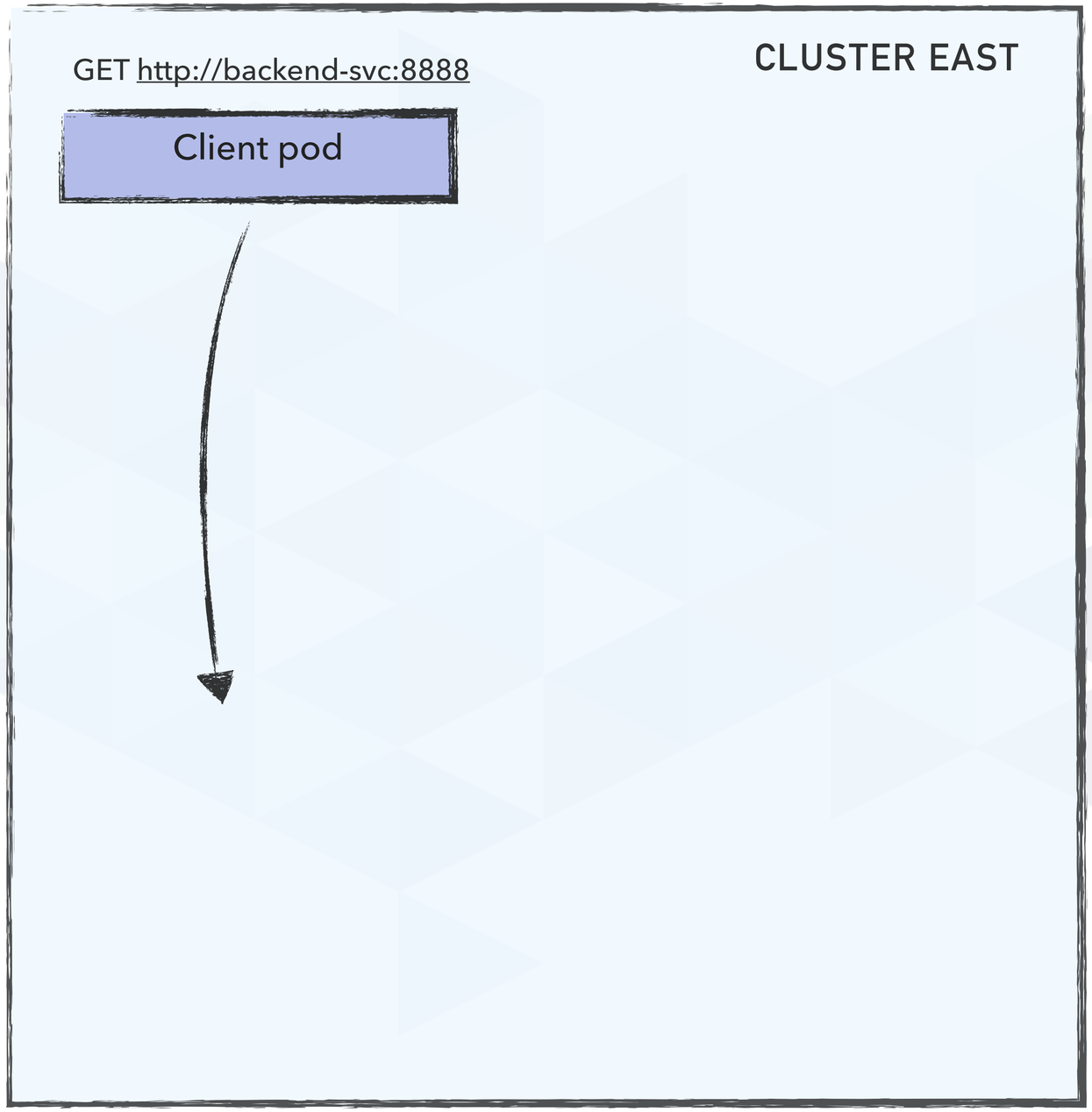

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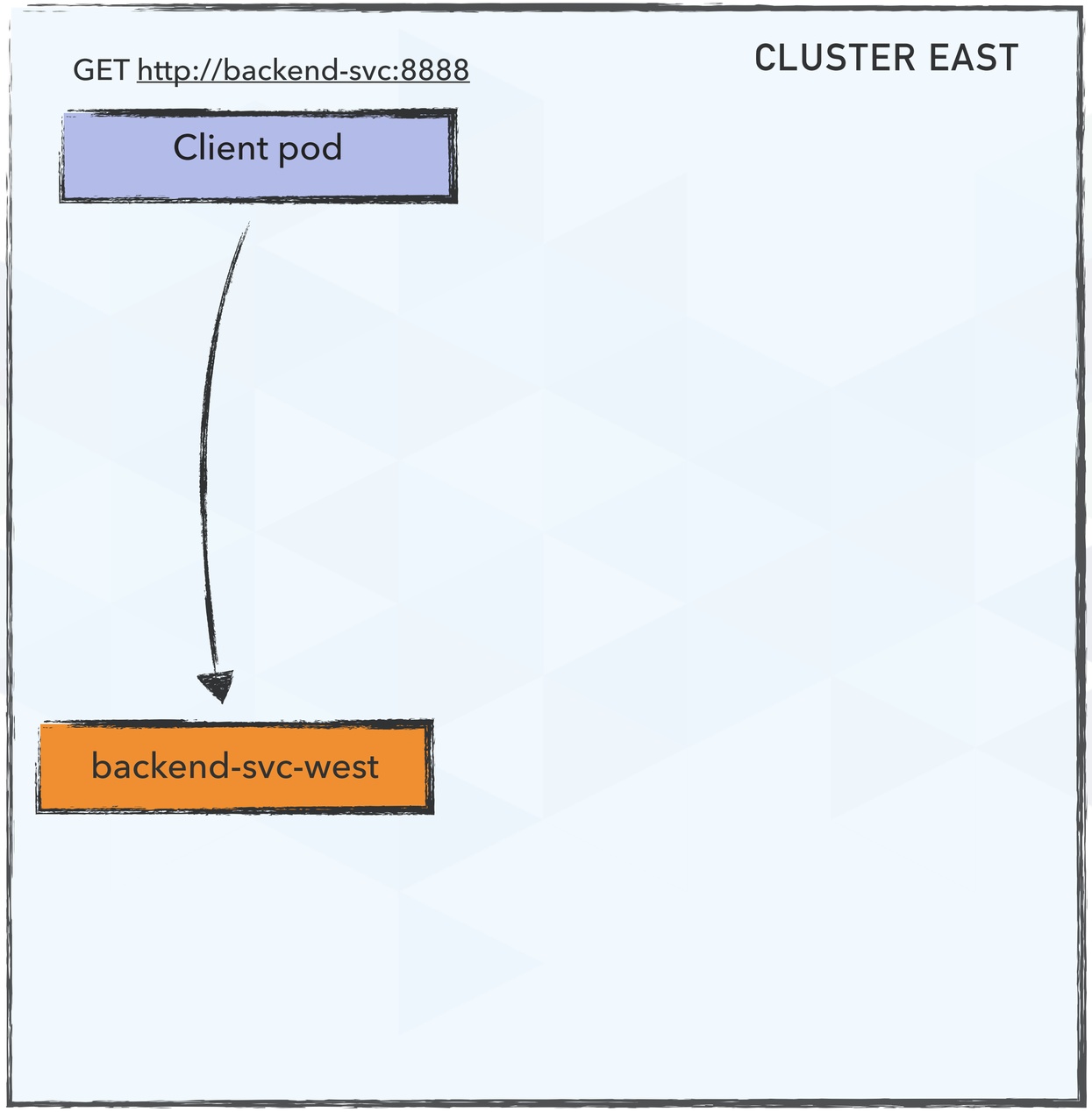

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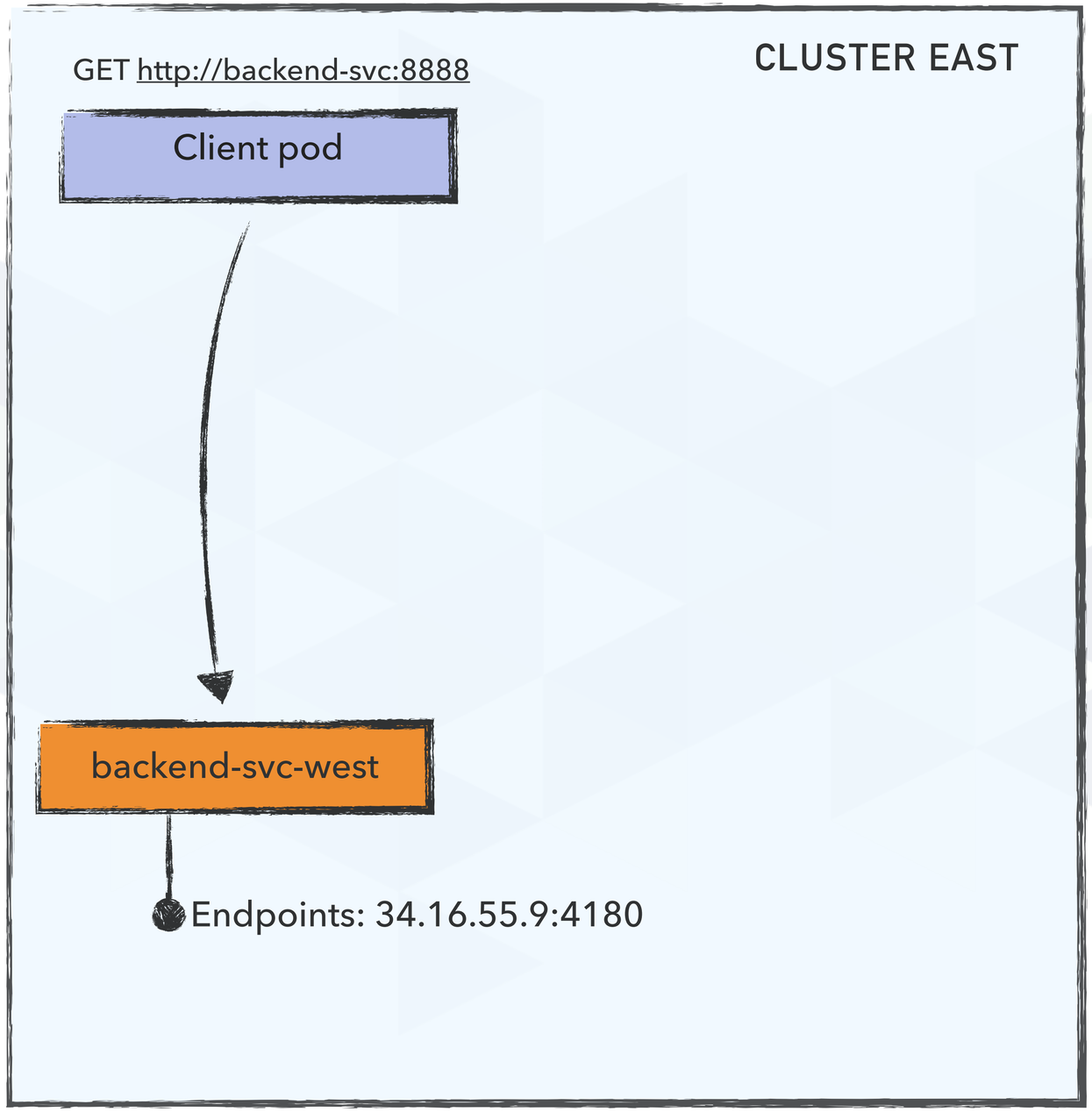

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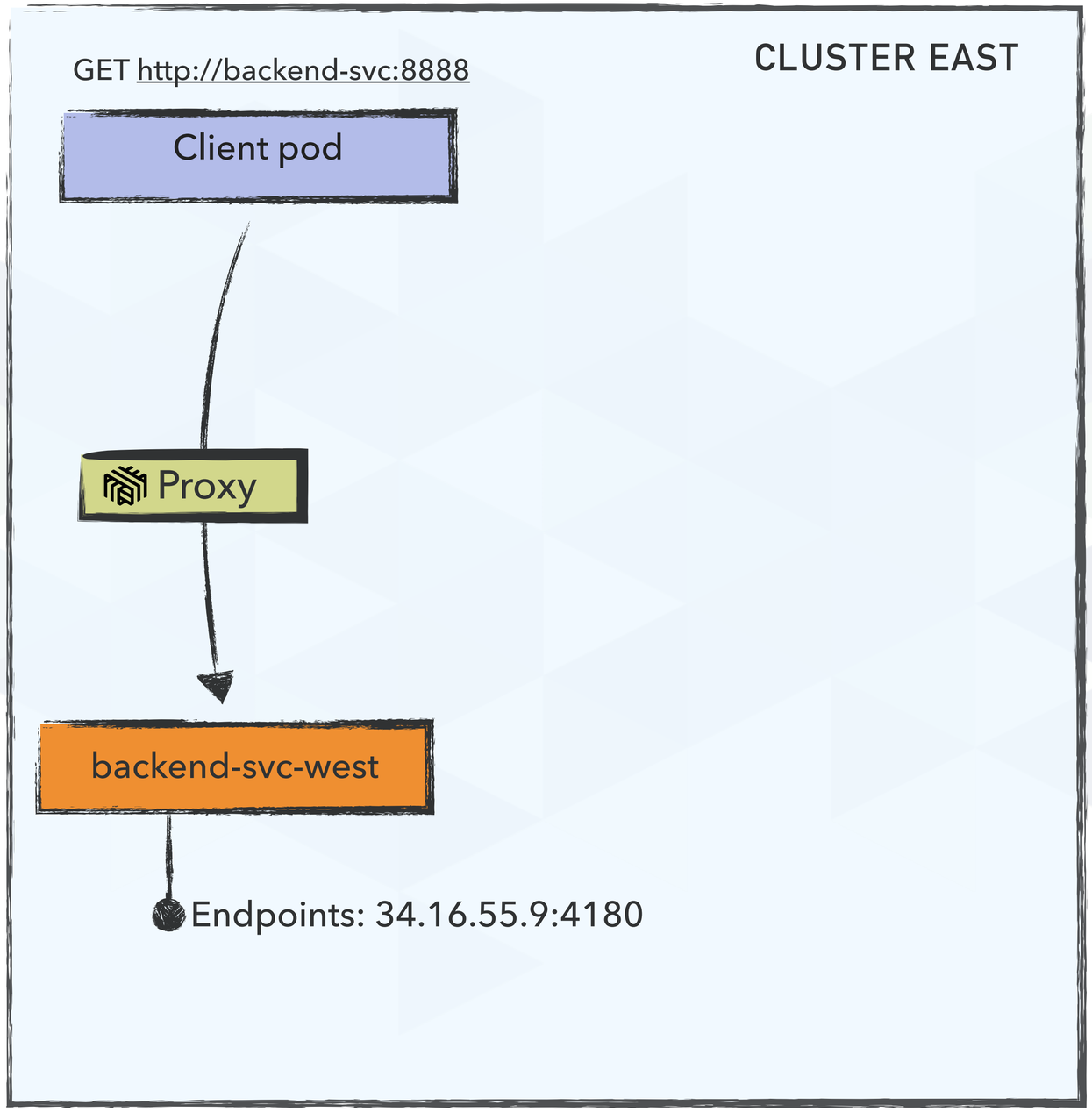

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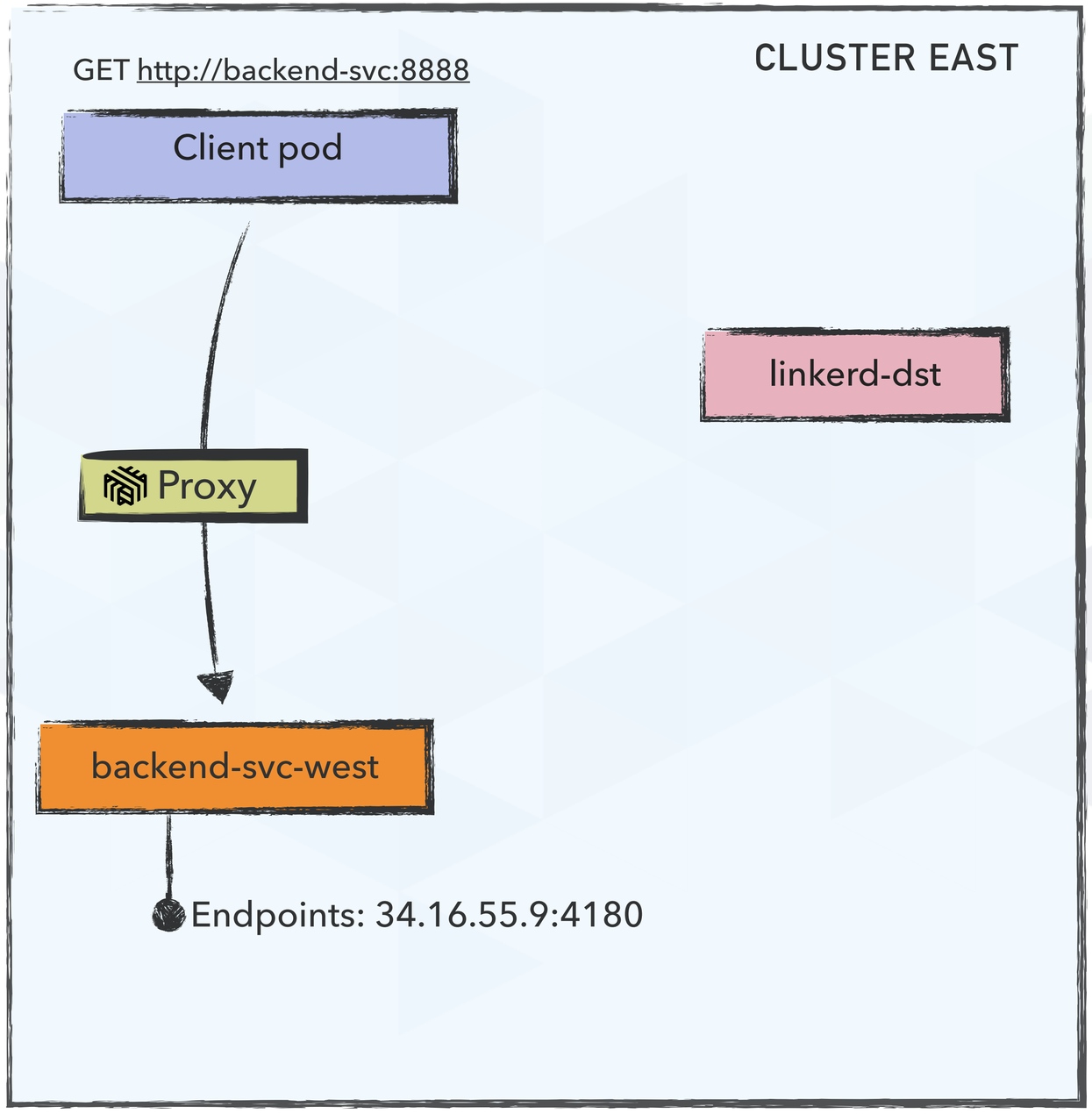

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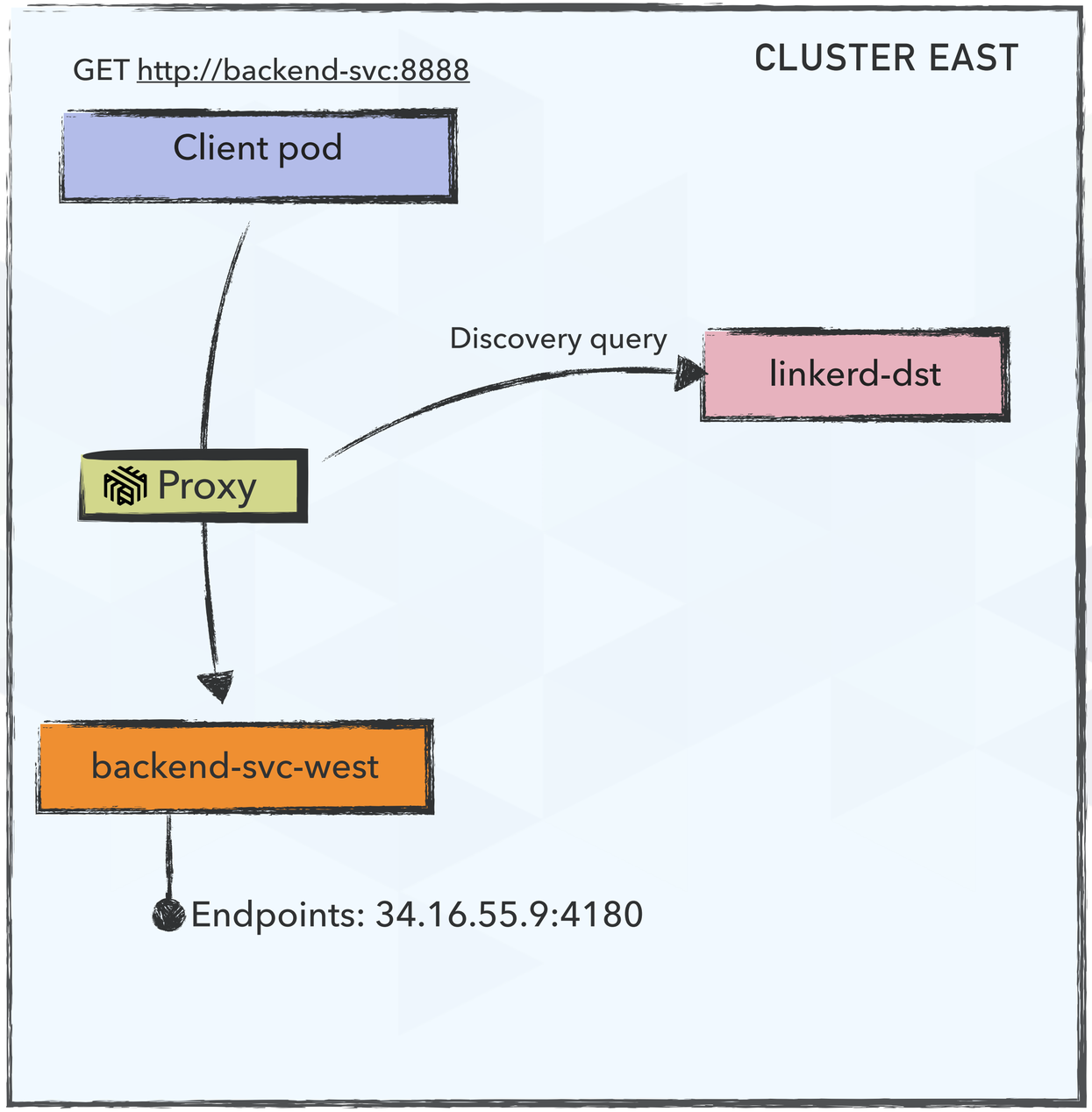

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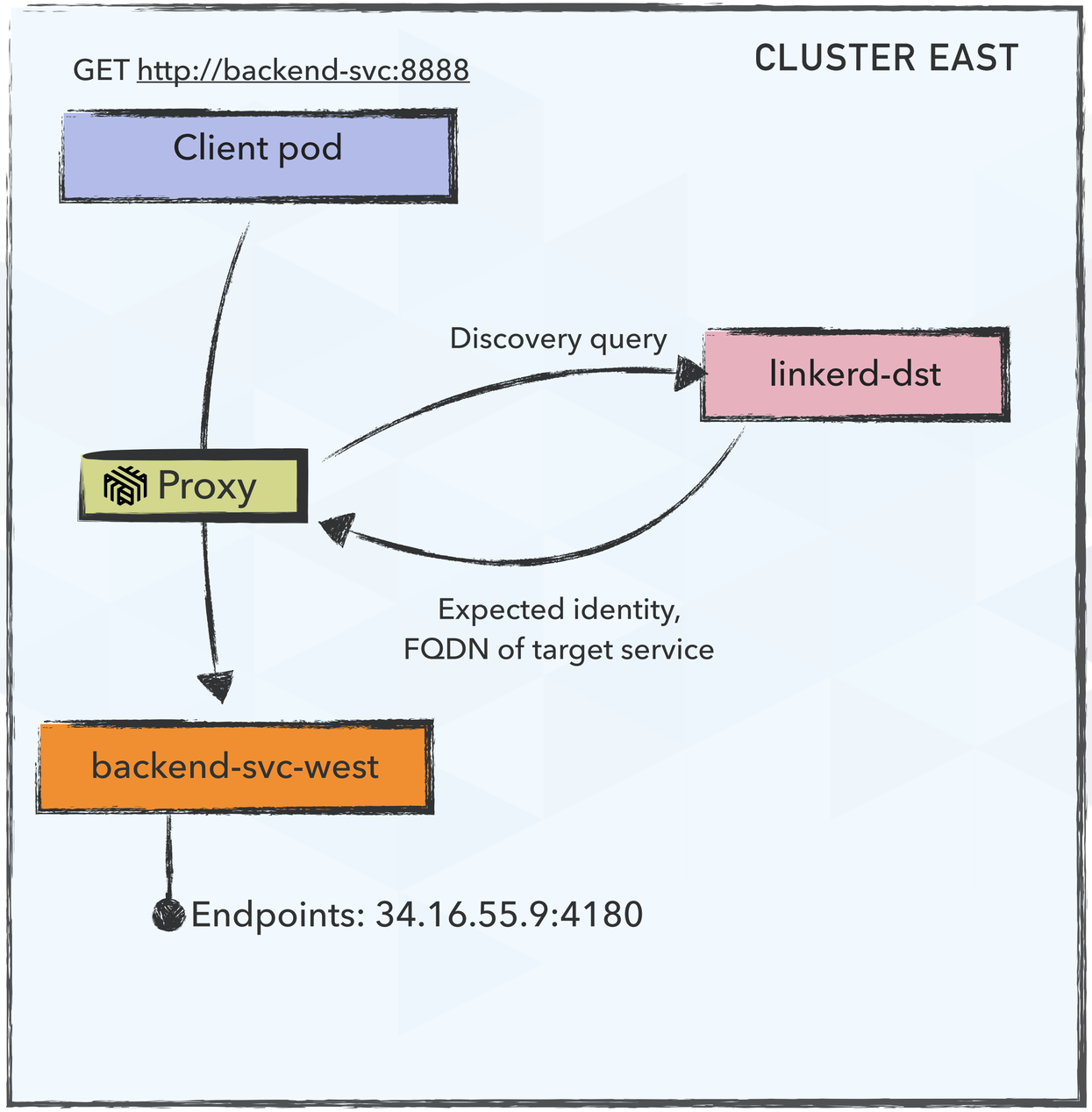

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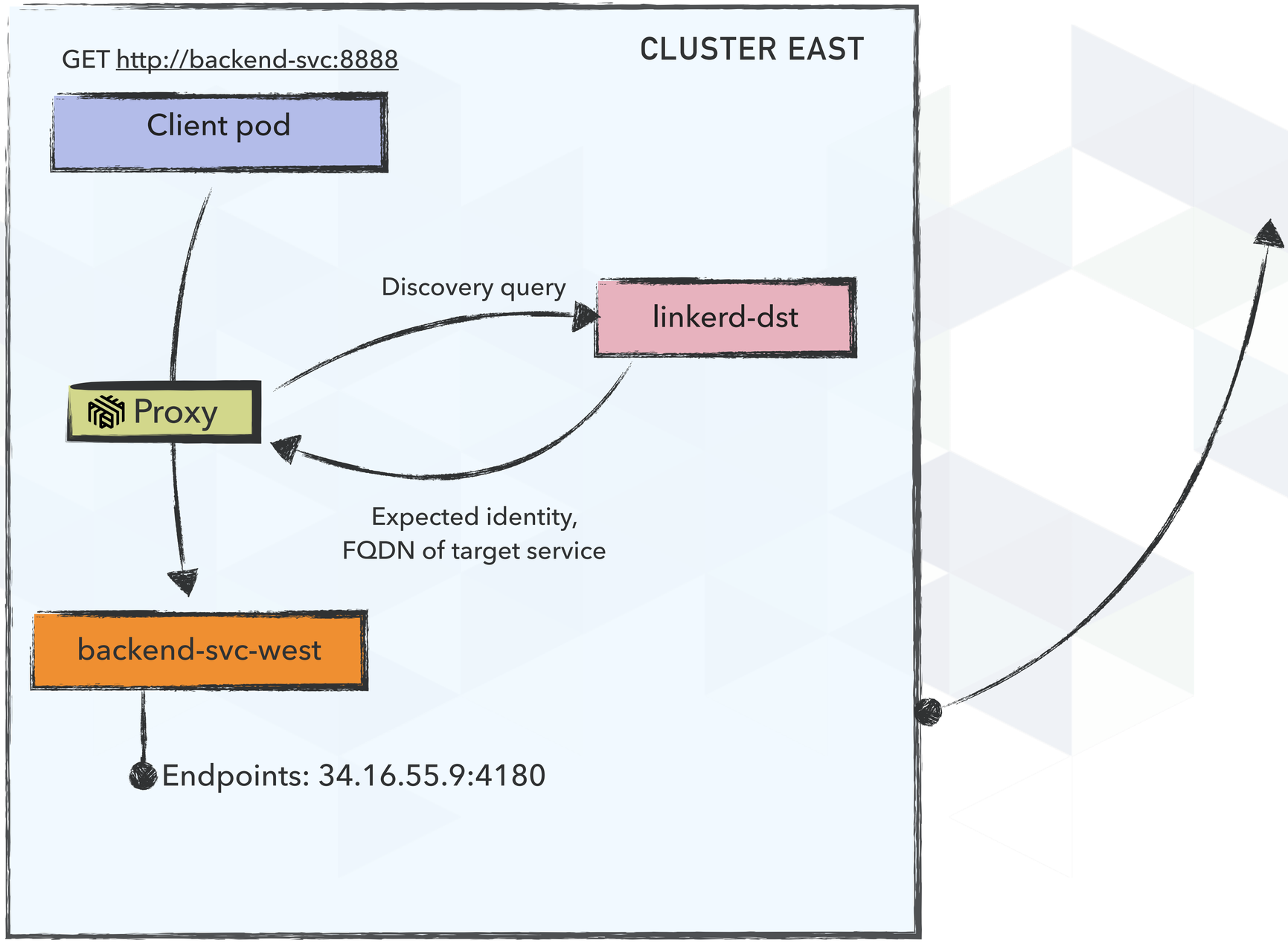

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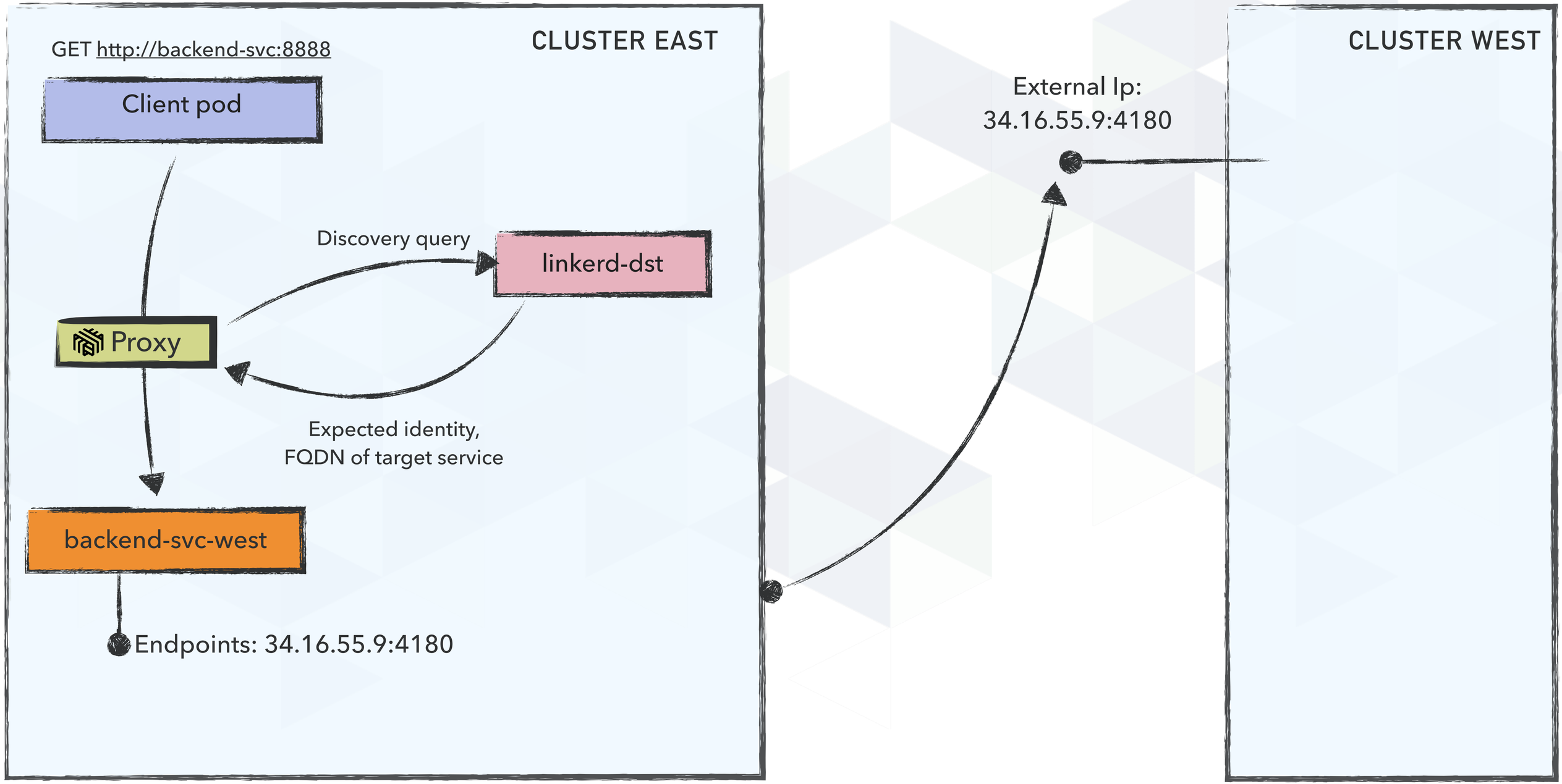

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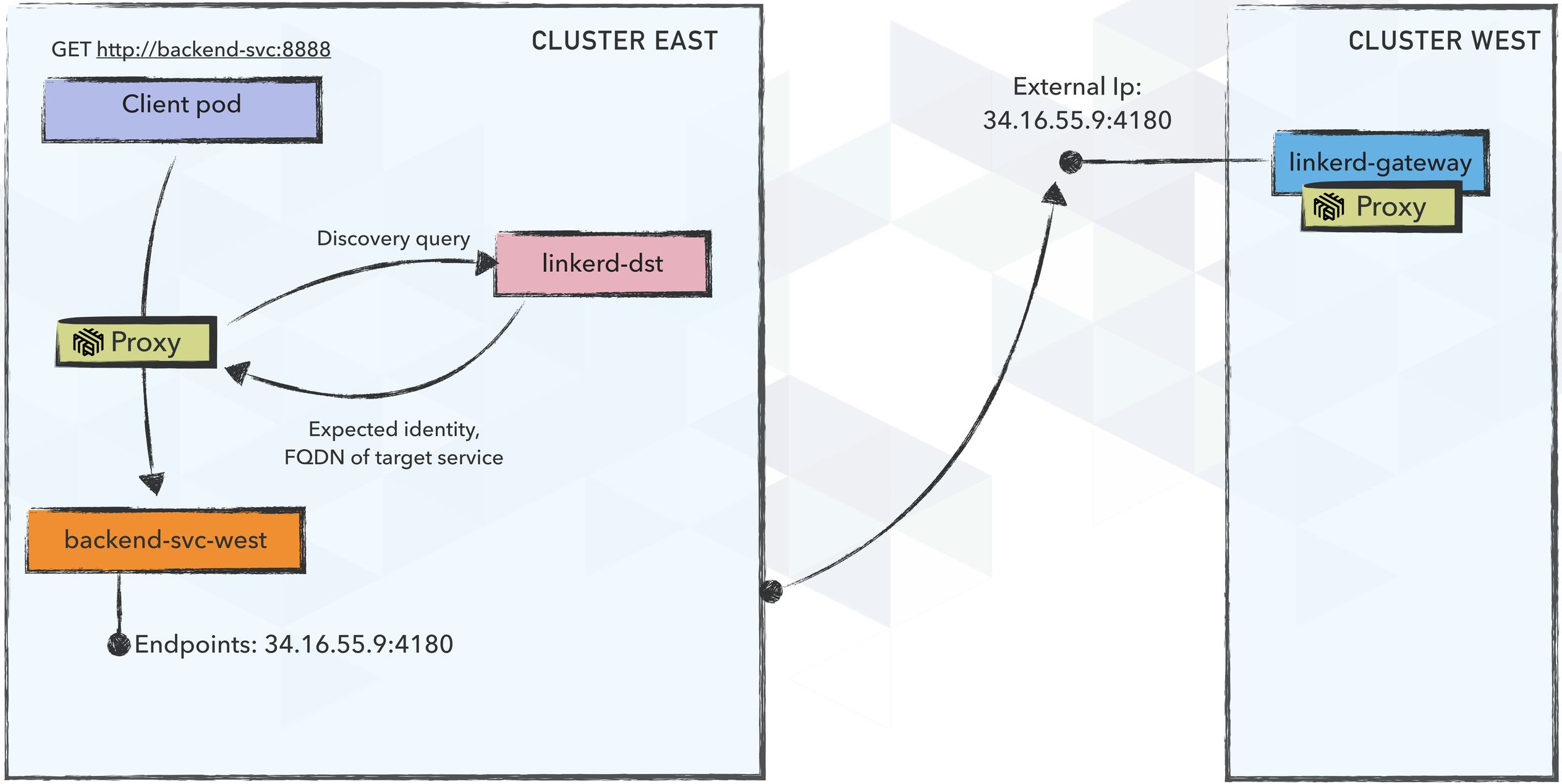

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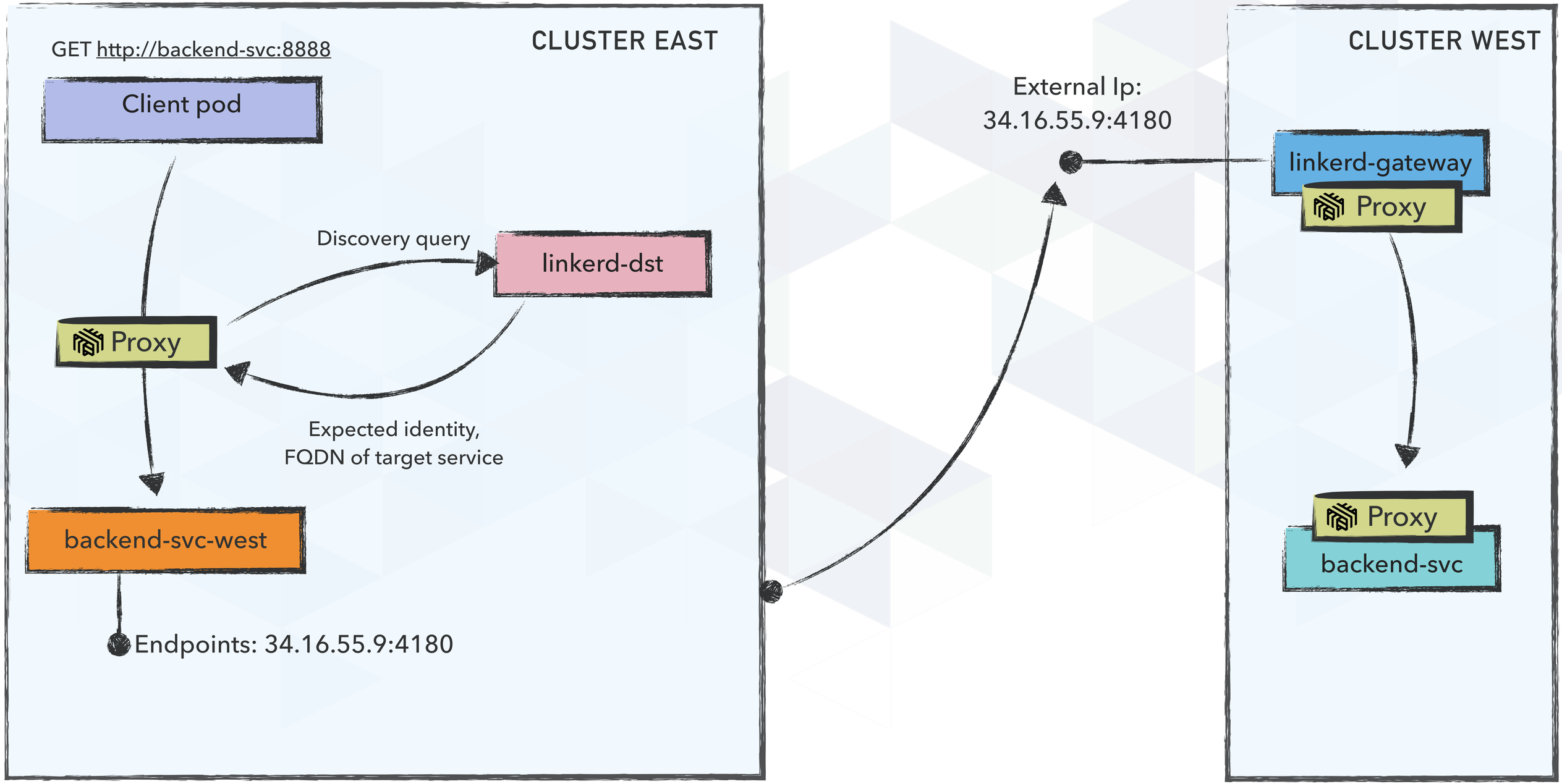

FUTURE WORK

- Service mirror controller per target cluster
- Introduce a CRD to better represent target cluster information
- Support traffic policy, finer grained permissions control
- Support for TCP traffic

Q&A

https://github.com/zaharidichev/talks