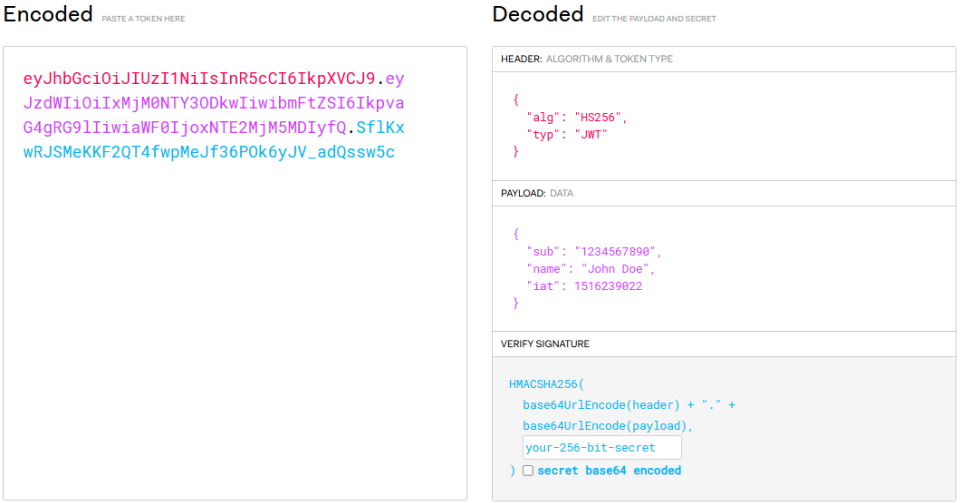
Enhancing Security with Istio: Realtime JWT Access Revocation

Josh Oberdick, Rocket Companies

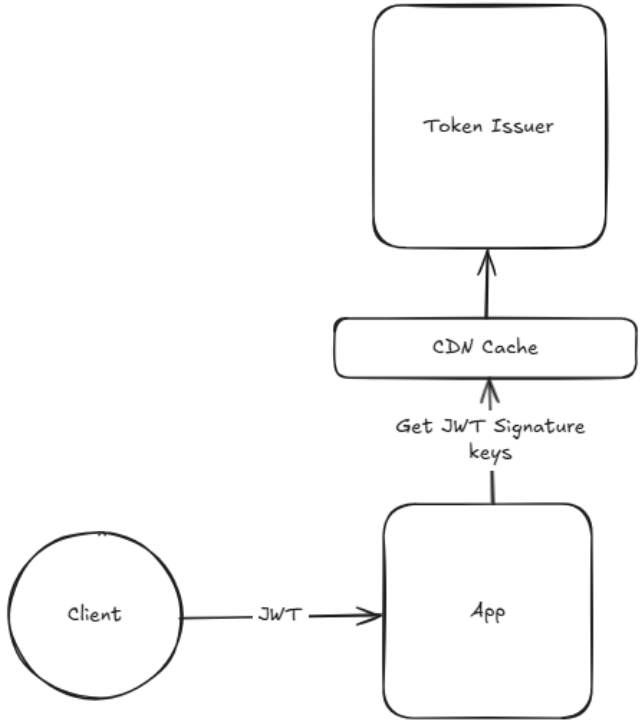
What are JWTs?

- Open standard for JSON based tokens
- Supports claims encoded in token
- Verifiable/tamper proof



Advantage of JWTs

- Lightweight – can be less than 1kB
- Portable – SDK's for all platforms
- **Stateless** – tokens can be verified at unlimited scale, even when token issuer is offline
- Performance – signature keys can be cached in local apps



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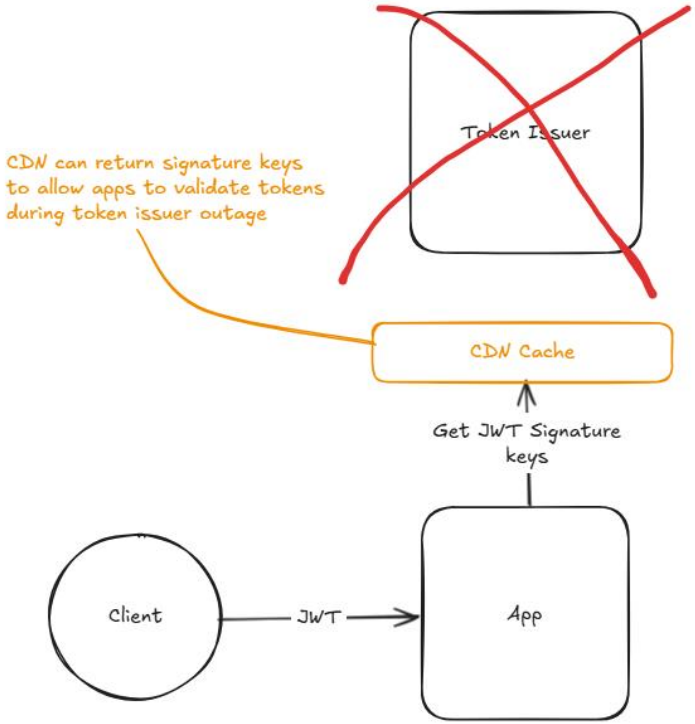

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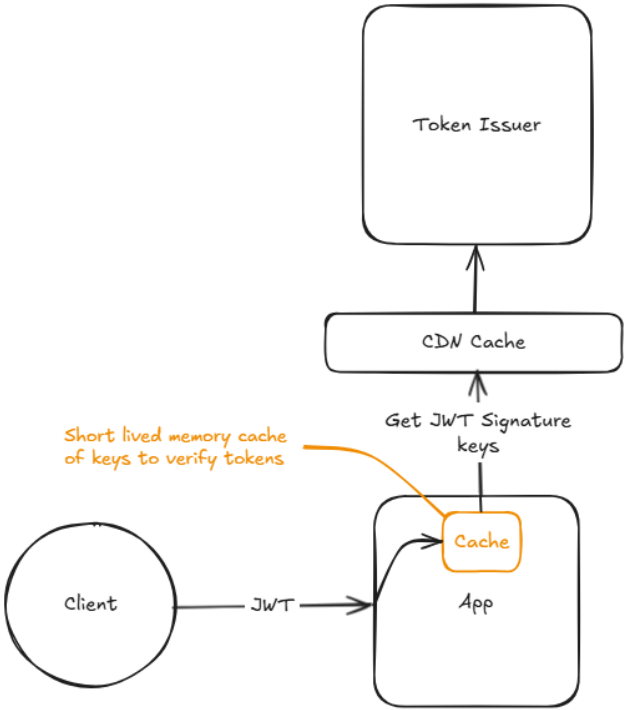

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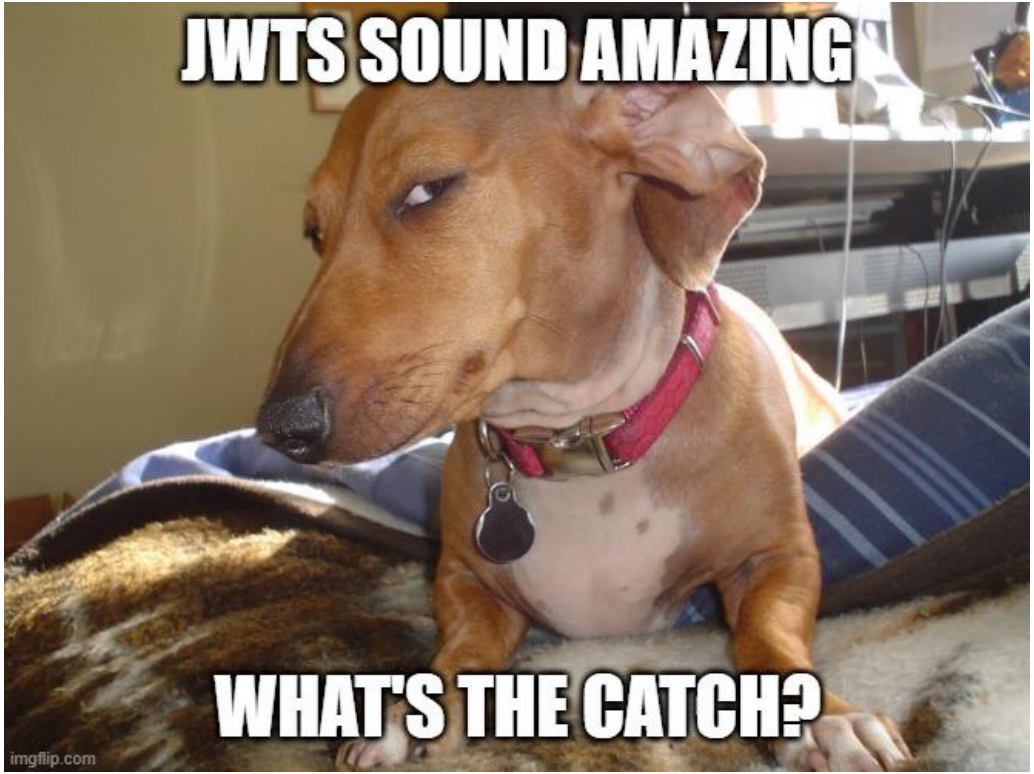


Biggest weakness of JWTs

PAYLOAD: DATA

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "iat": 1516239022,
  "exp": 1516249022
}
```

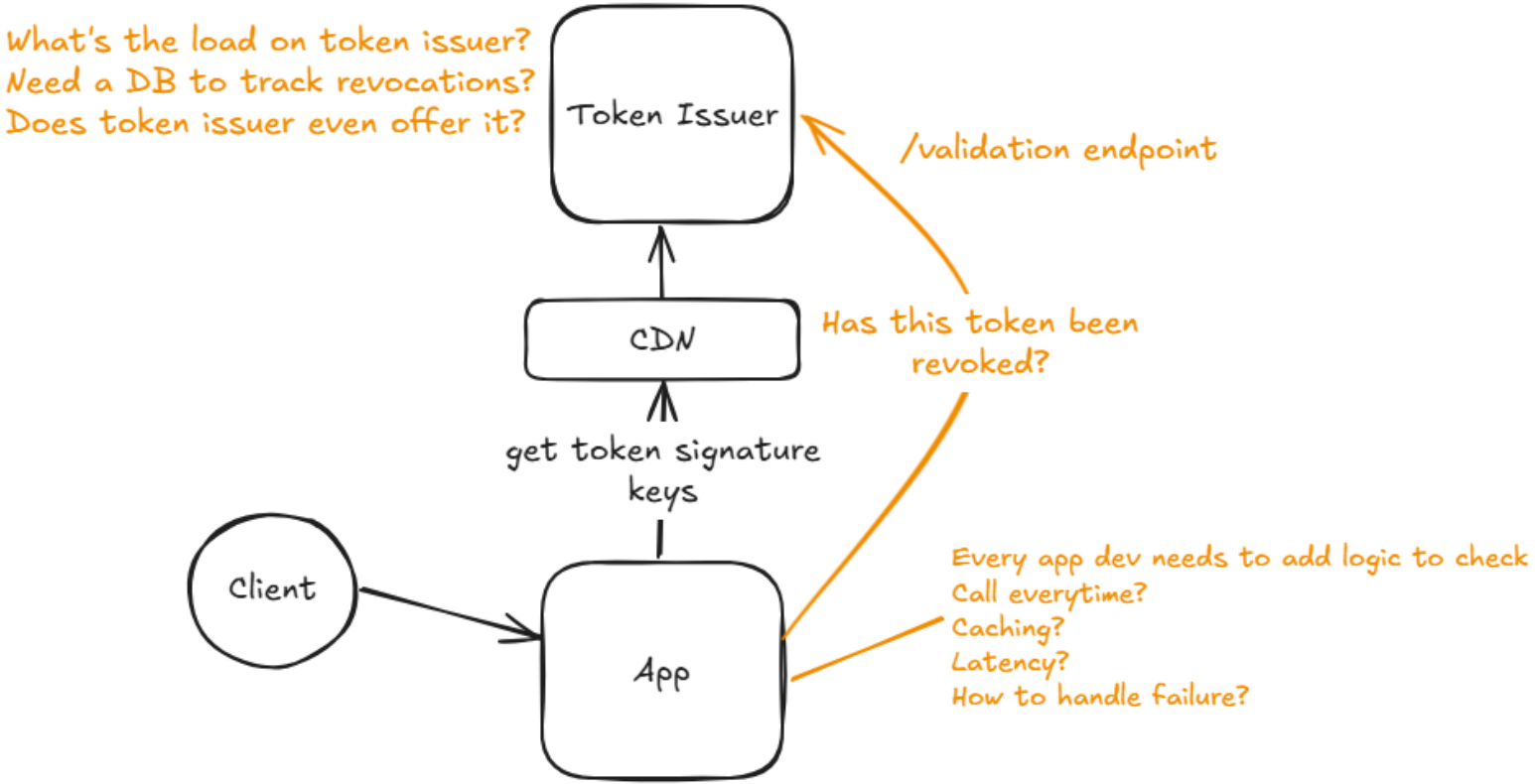
You have unlimited scale for your tokens

They can never be revoked before their expiration

Should you care?

Security team – “Hi, we just found out Jane’s account was compromised. We need to disable all their access immediately!”
Ops team – “No problem, we will disable the account right now.”
Security team – “Thanks! All Their app access is removed then?
Ops team – Uh, well actually any app that had a token still has access for the next few hours 😬…
Security team – …
Security team – How is that possible!?
Ops team – we use JWTs🙂
< CIO has joined the chat >

Asking your app dev teams to solve



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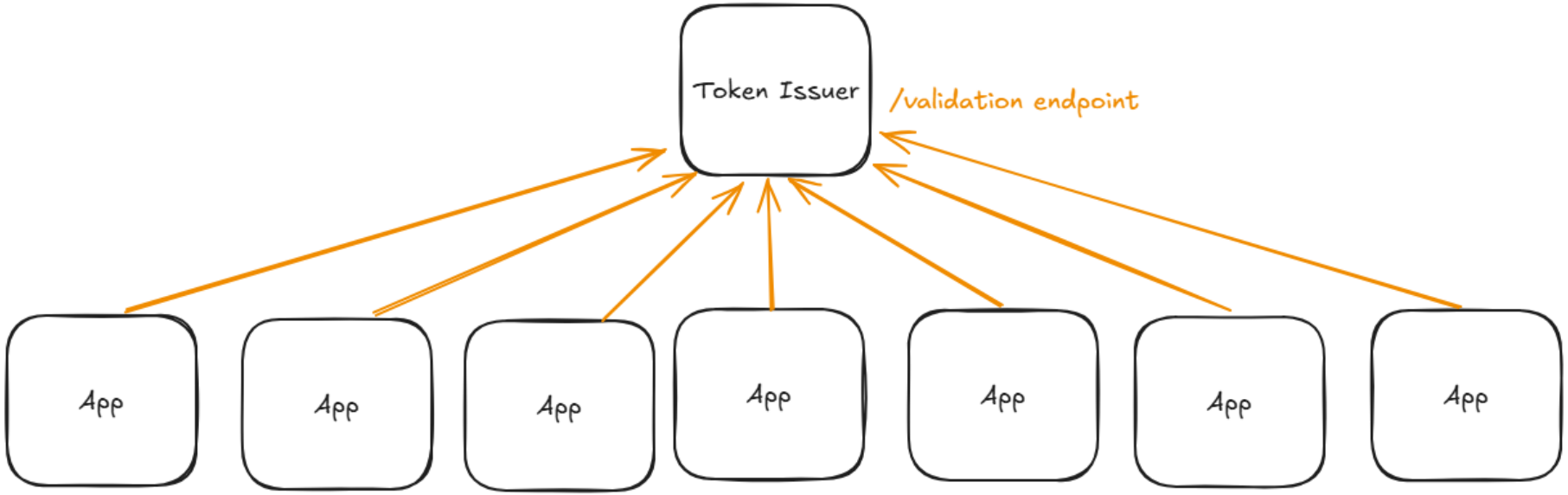

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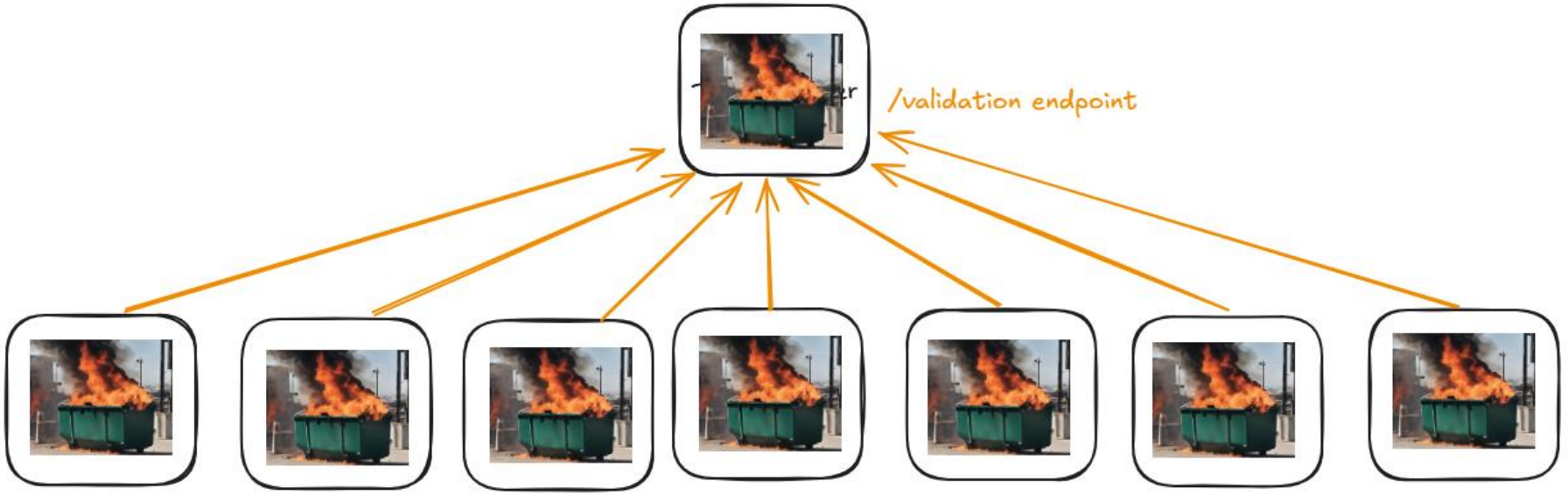
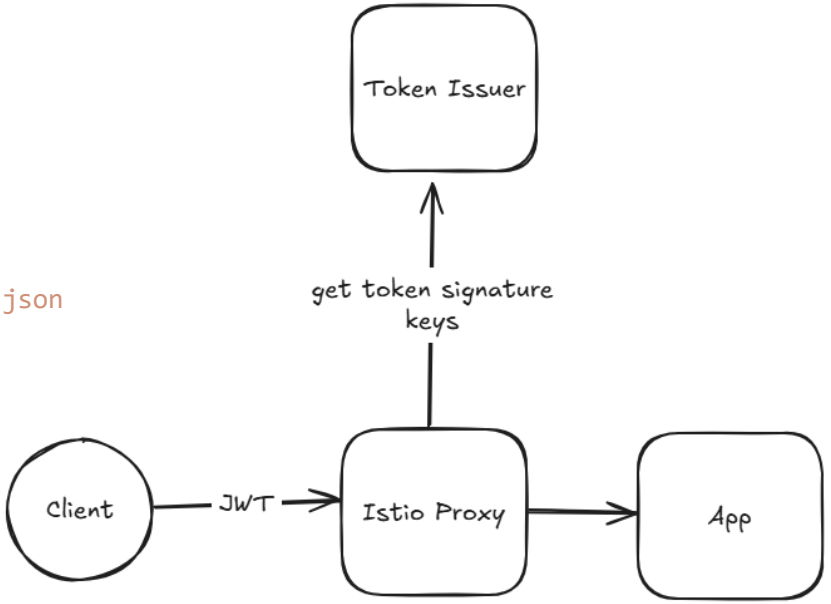


Istio to the rescue


```yaml
apiVersion: security.istio.io/v1
kind: RequestAuthentication
metadata:
  name: httpbin
  namespace: foo
spec:
  selector:
    matchLabels:
      app: httpbin
  jwtRules:
  - issuer: "issuer-foo"
    jwksUri: https://example.com/.well-known/jwks.json
---
apiVersion: security.istio.io/v1
kind: AuthorizationPolicy
metadata:
  name: httpbin
  namespace: foo
spec:
  selector:
    matchLabels:
      app: httpbin
  rules:
  - from:
    - source:
        requestPrincipals: ["*"]
```



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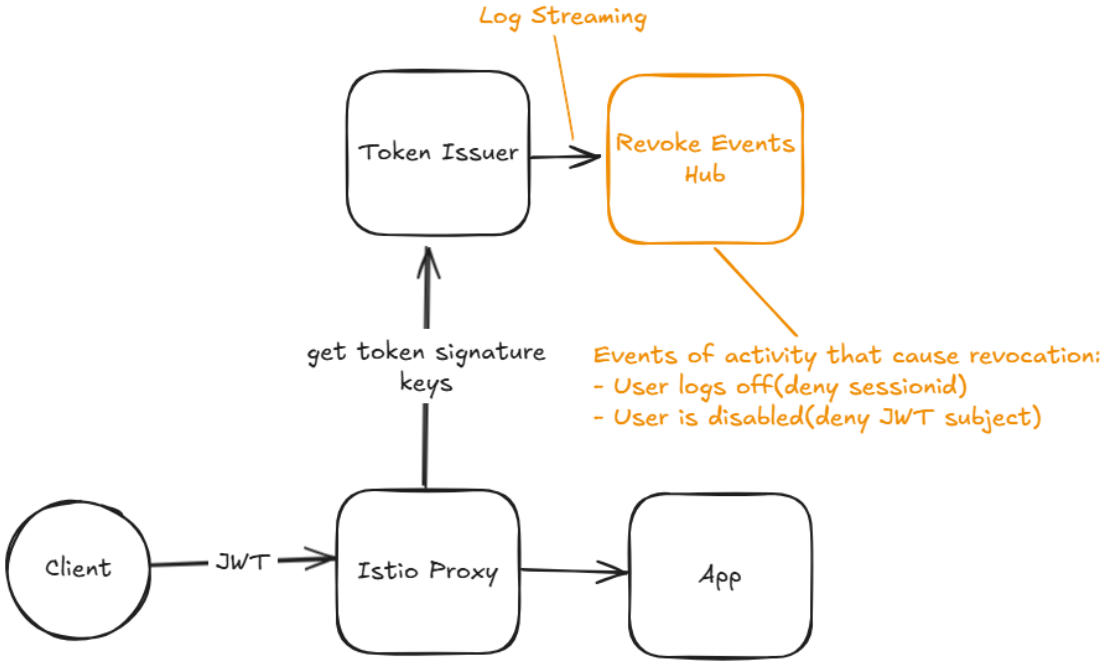

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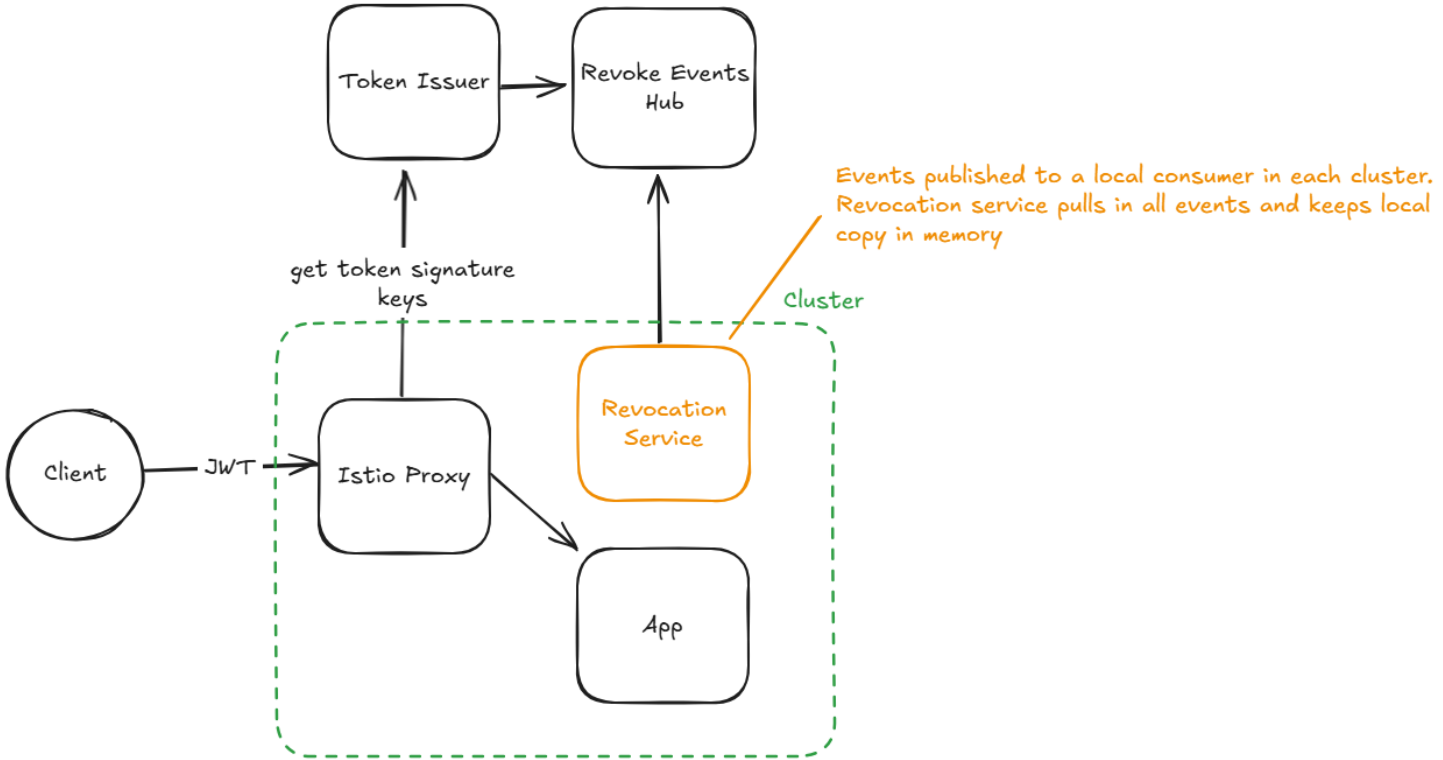

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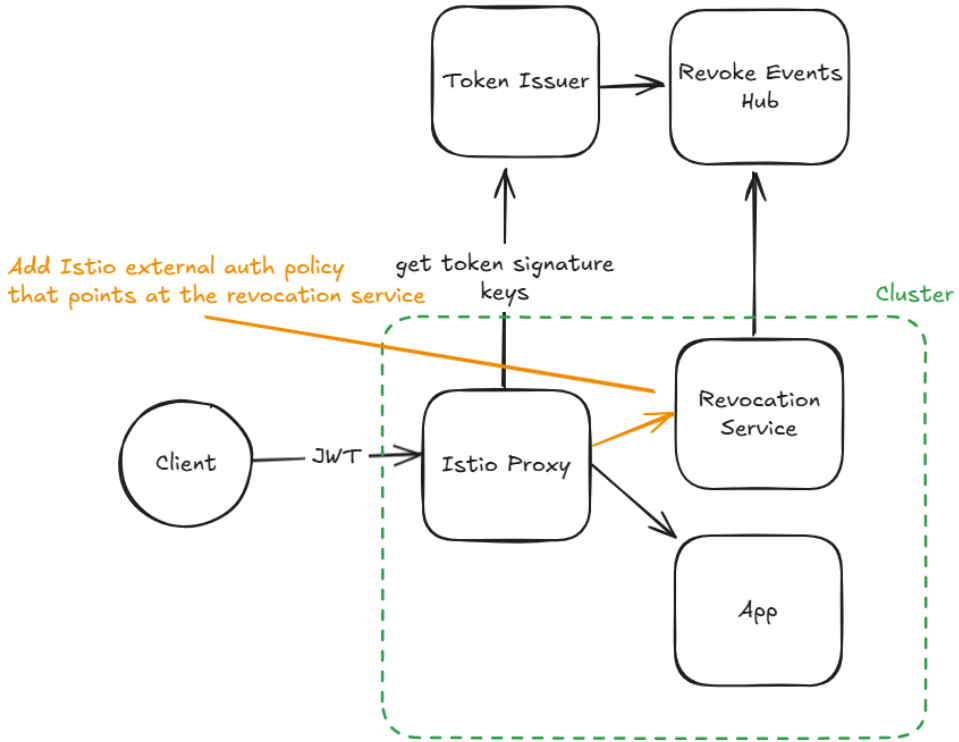

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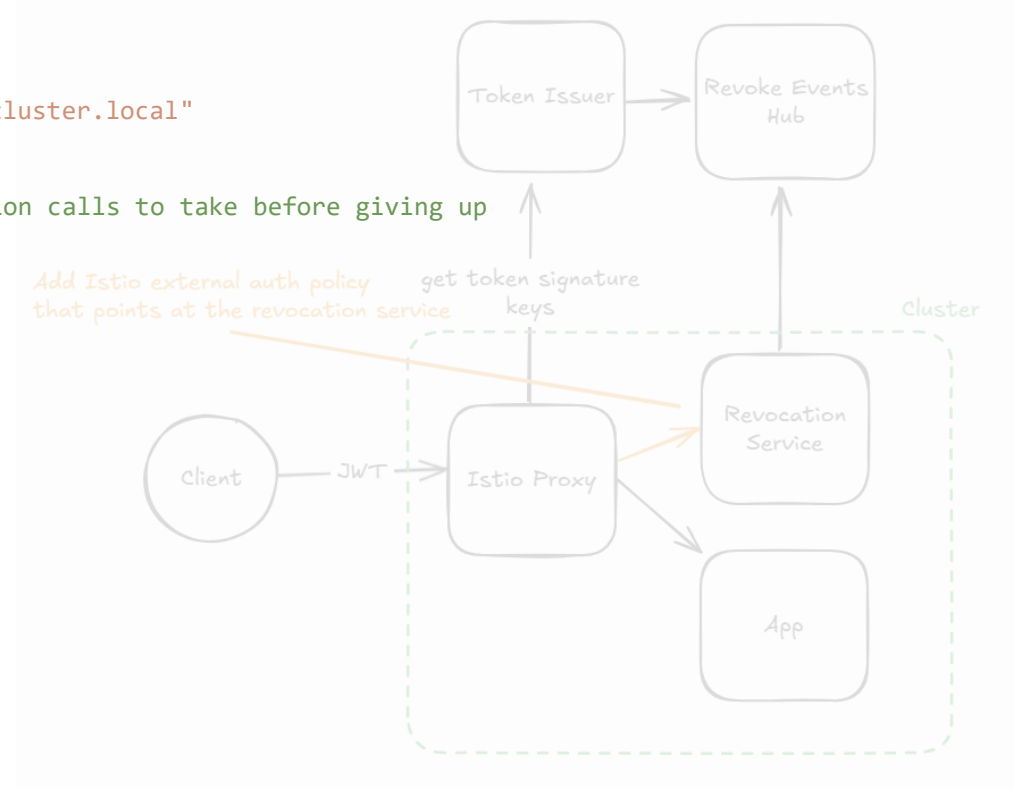
```yaml
meshConfig:
  extensionProviders:
  - name: "revocation-service"
    envoyExtAuthzHttp:
      service: "revocation-service.foo.svc.cluster.local"
      port: "80"
      failOpen: # true or false
      timeout: # time that we allow revocation calls to take before giving up
```



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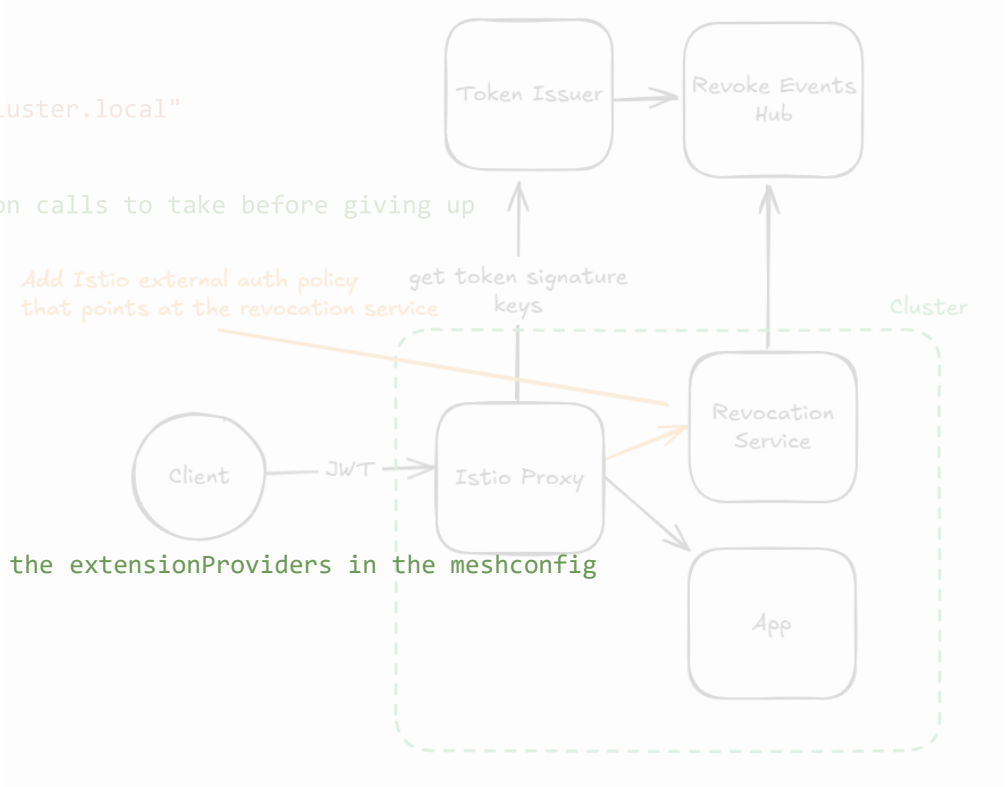
```yaml
apiVersion: security.istio.io/v1
kind: AuthorizationPolicy
metadata:
  name: revocation-check
spec:
  selector:
    matchLabels:
      app: httpbin
  action: CUSTOM
  provider:
    # The provider name matches the name of the extensionProviders in the meshconfig
    name: revocation-service
  rules:
  - to:
    - operation:
        paths: ["/*"]
```



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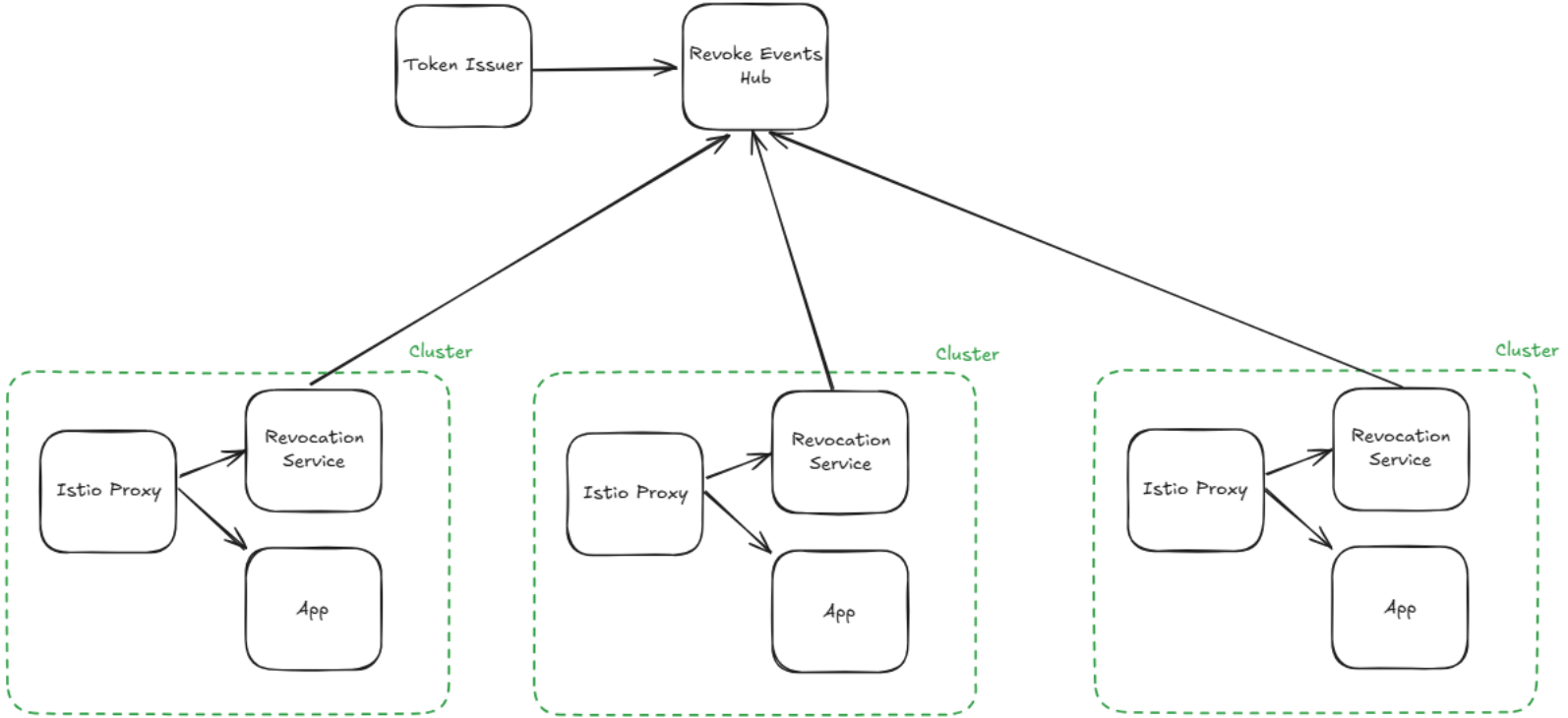

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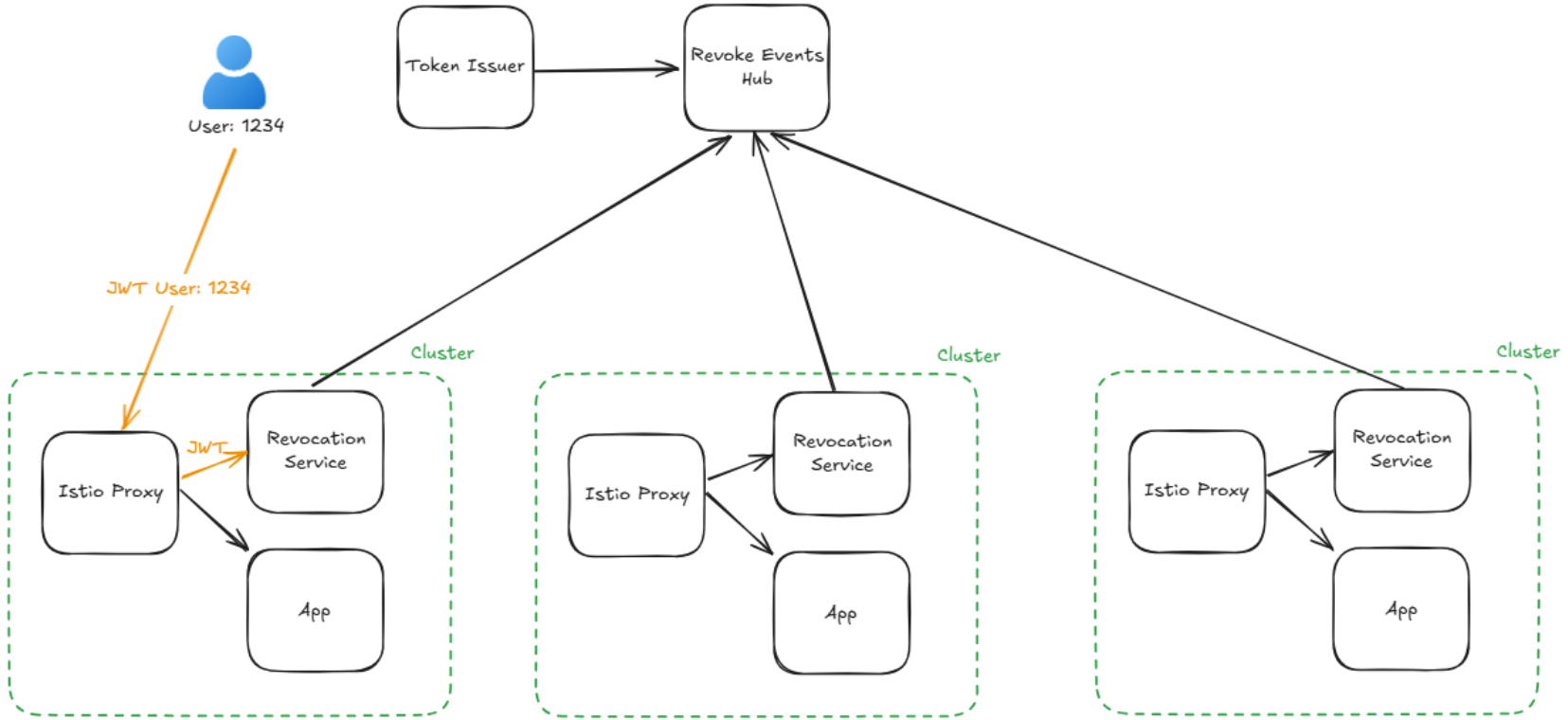

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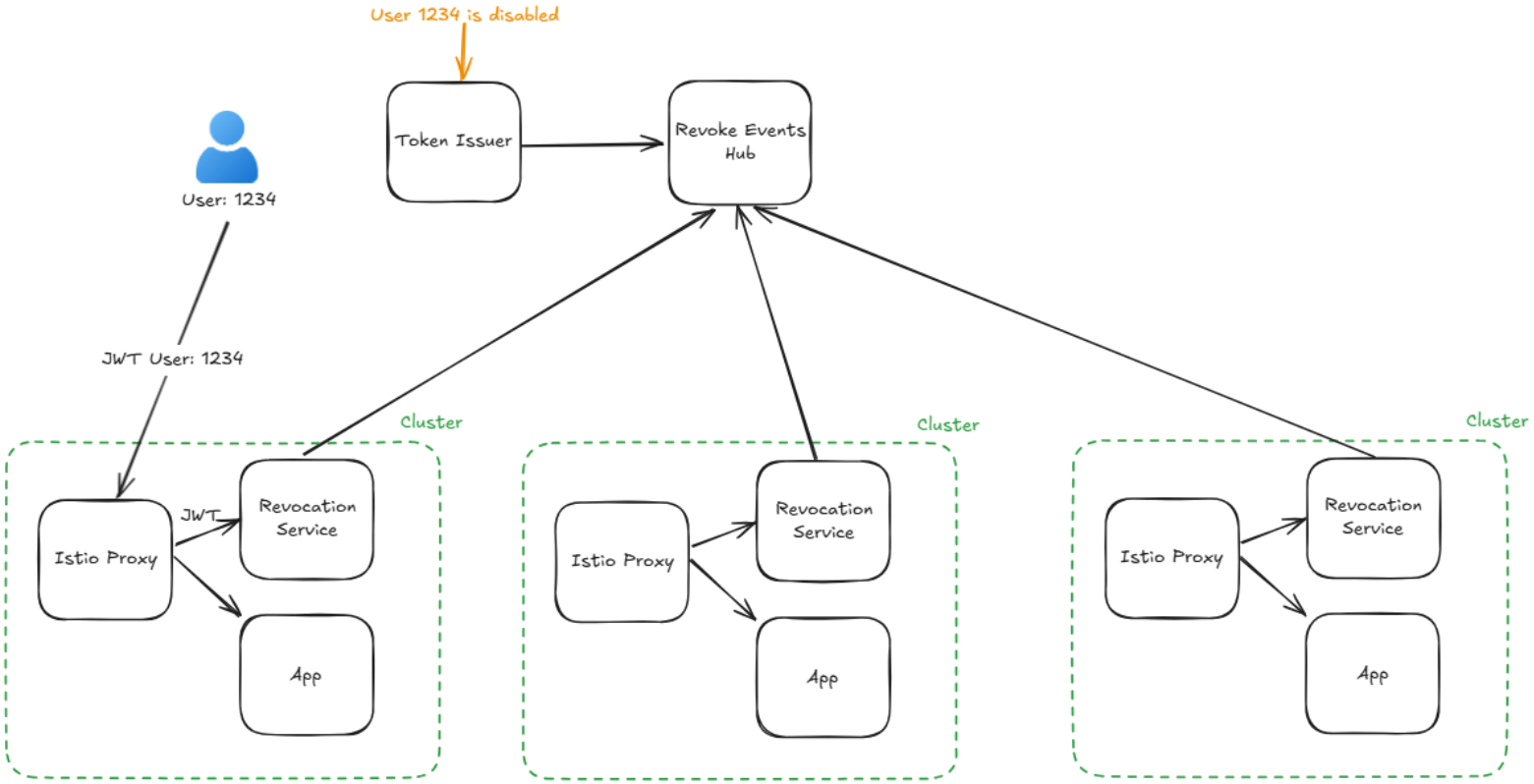

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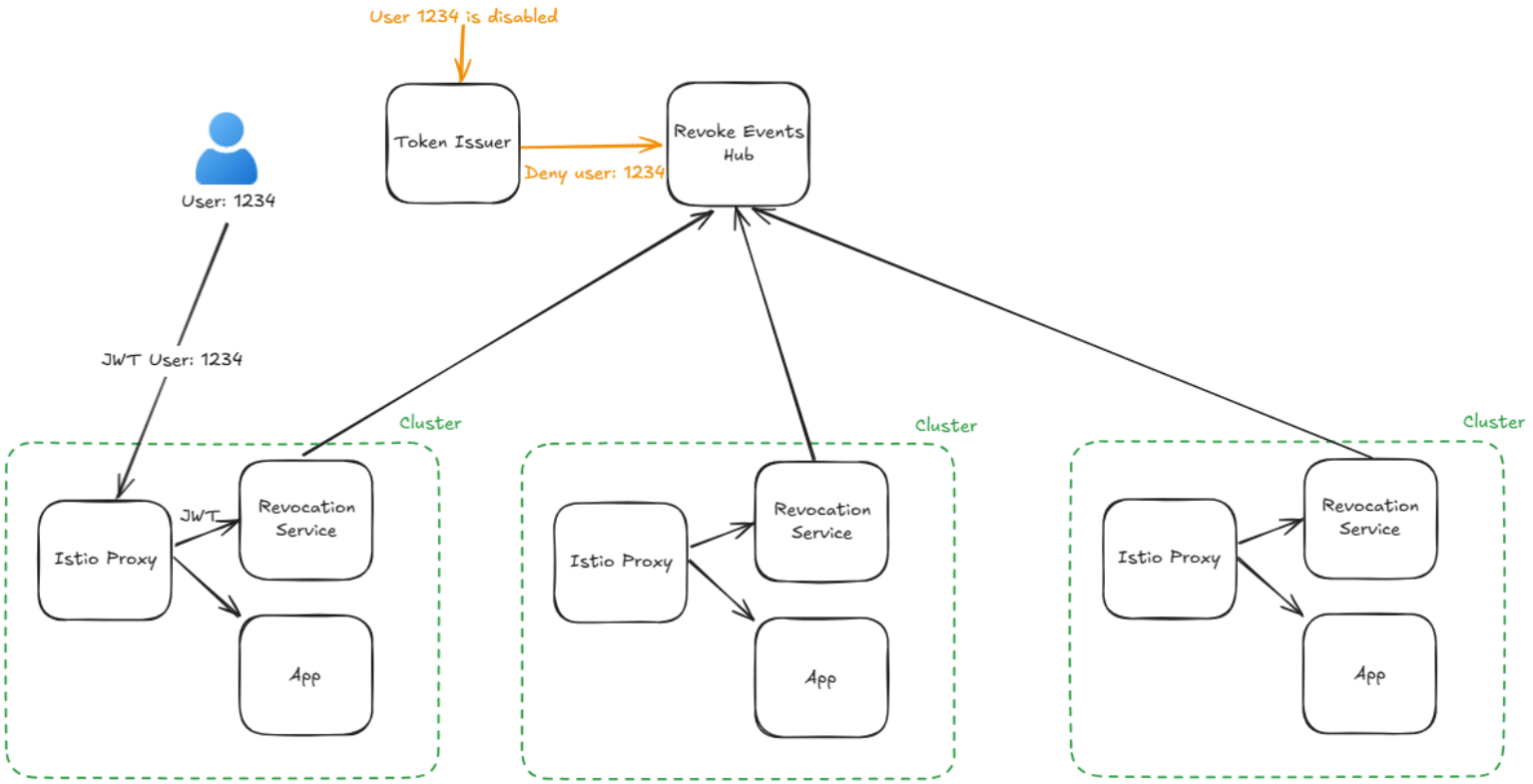

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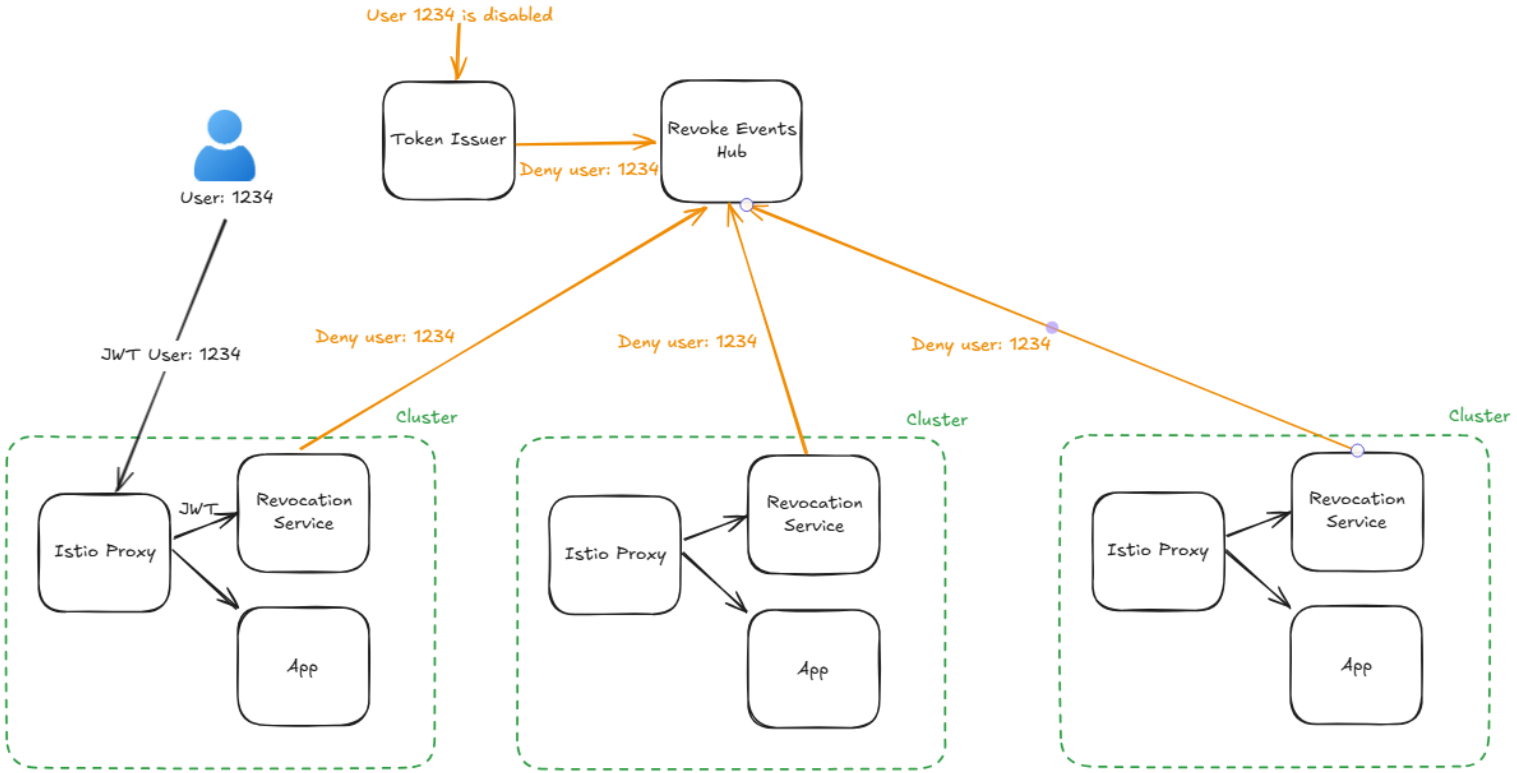

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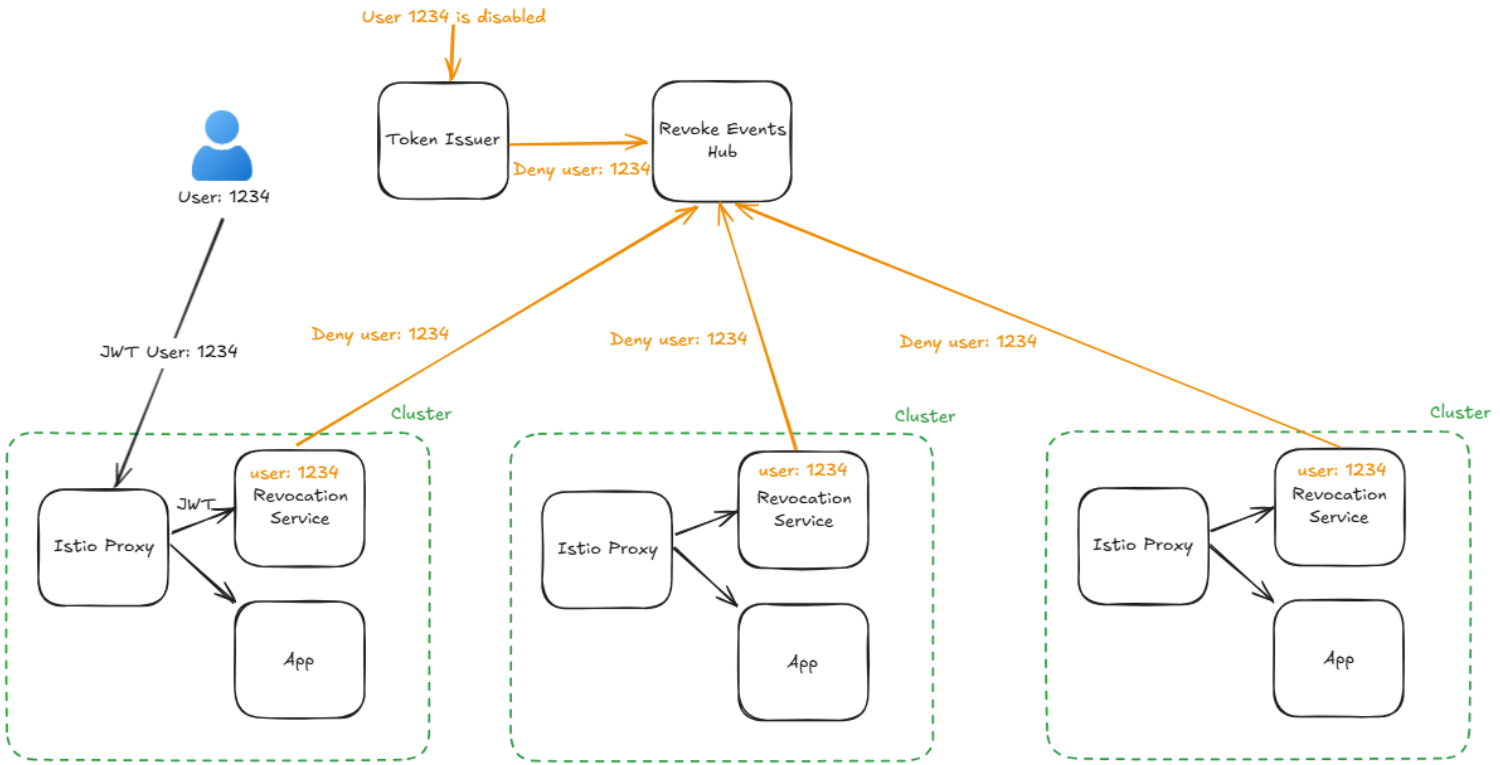

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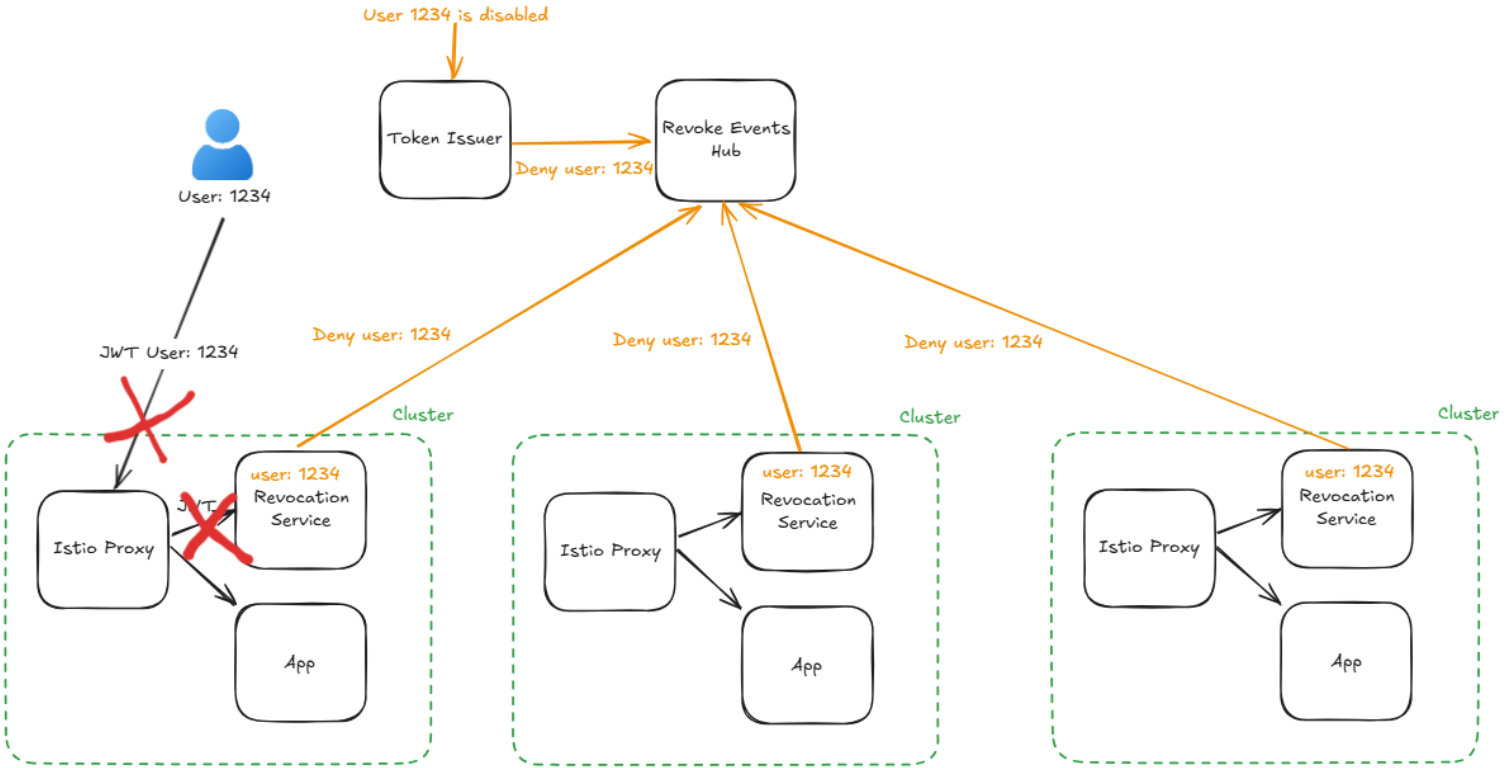

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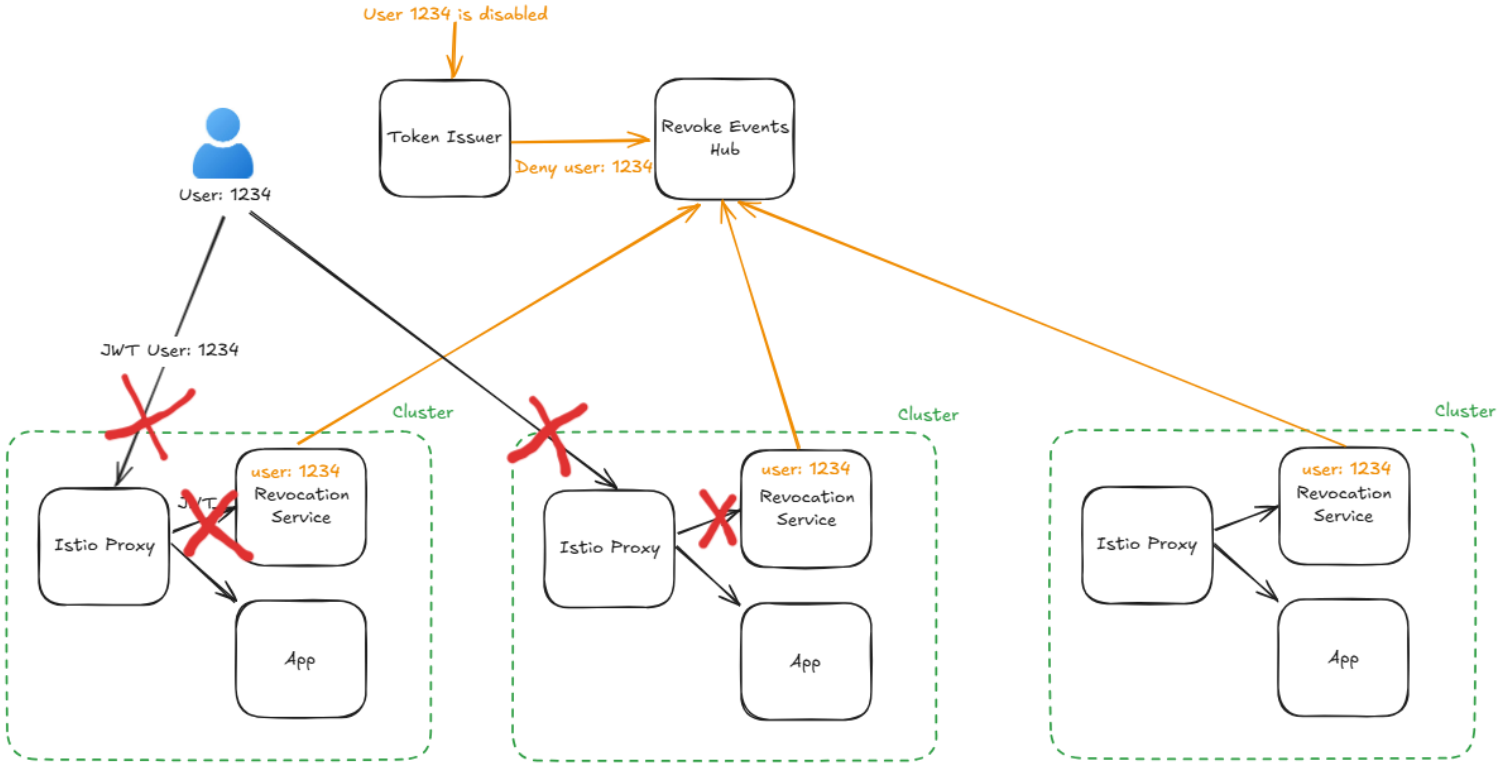

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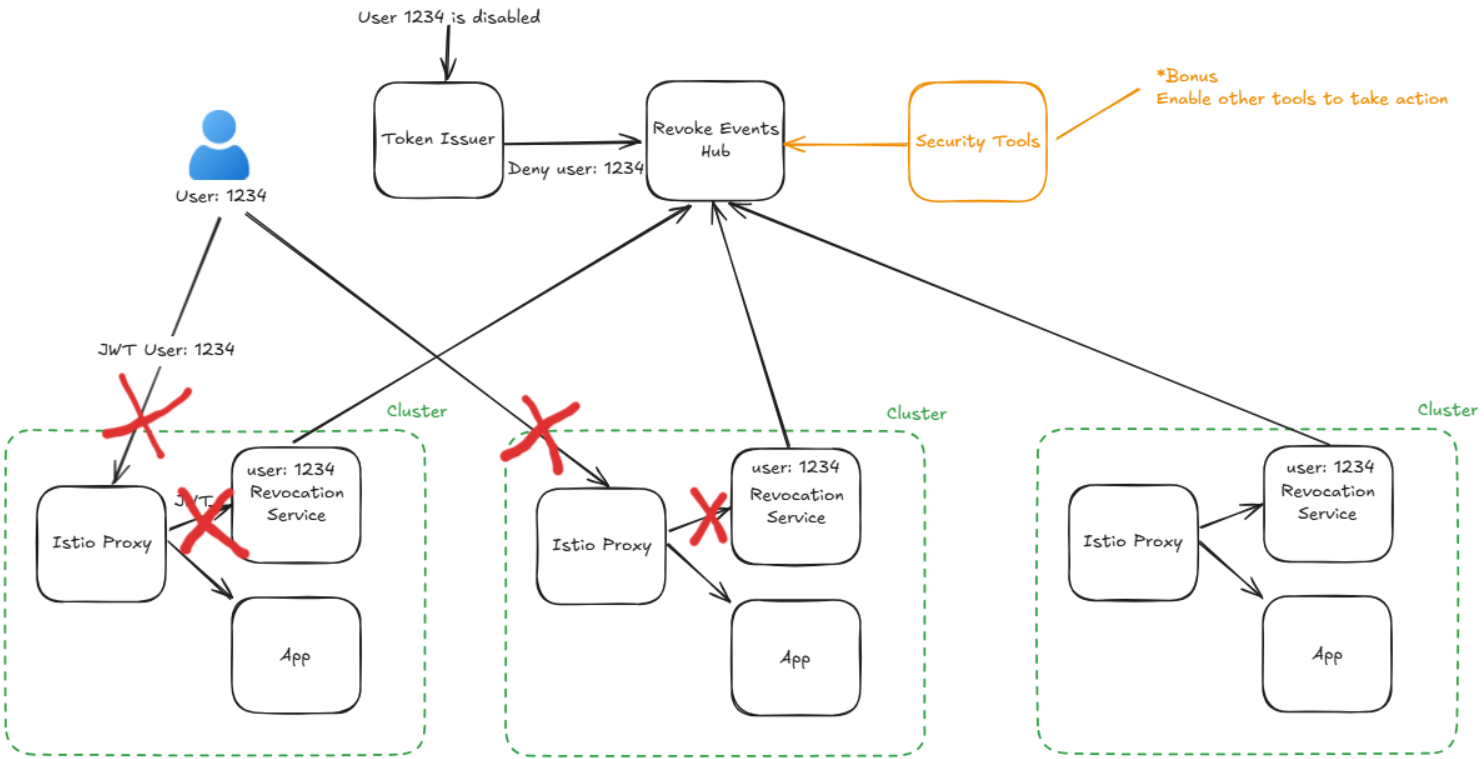

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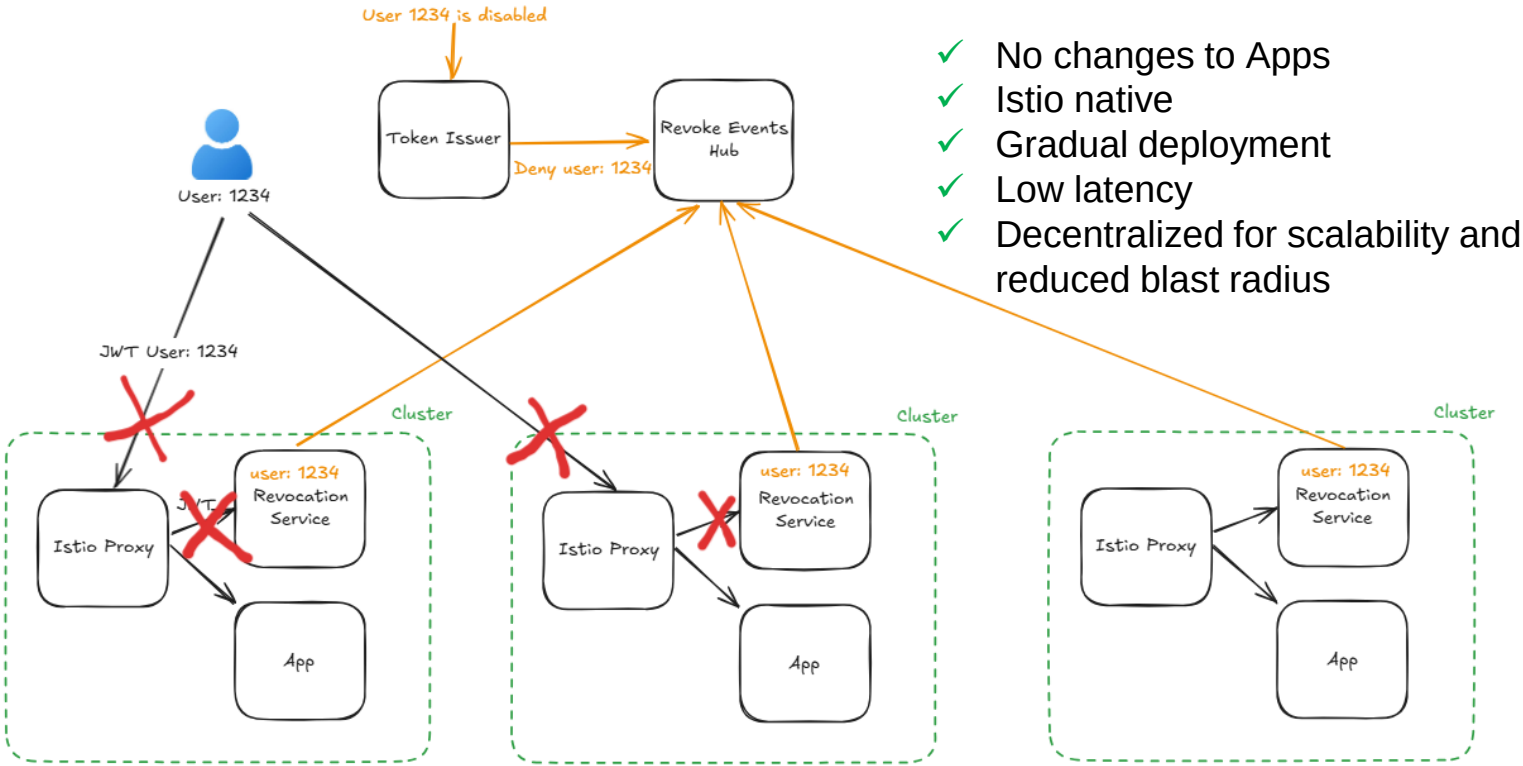

- ✓ No changes to Apps
- ✓ Istio native
- ✓ Gradual deployment
- ✓ Low latency
- ✓ Decentralized for scalability and reduced blast radius

Closing

Things to keep in mind:

- Istio “Custom” authorization comes BEFORE standard authorization policies
- Canary and Locality based routing is not supported in external authorization

Inspiration:

- Continuous Access Evaluation By Microsoft
- Shared Signals by OpenID foundation: https://sharedsignals.guide/

Thanks to my colleague Matt Williams

Demo