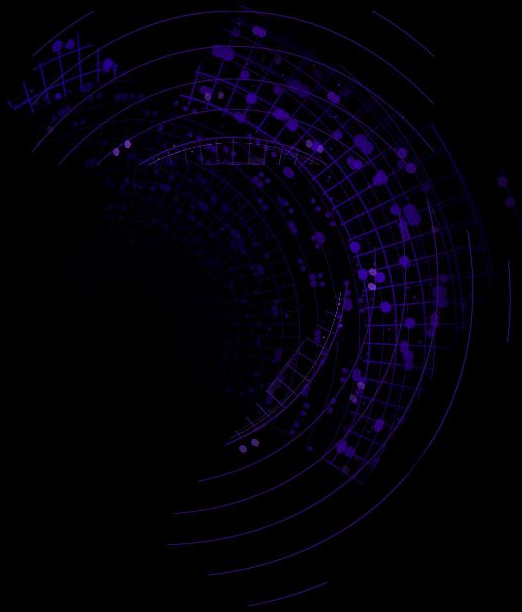
APACHE APISIX



Use Apache APISIX on Kubernetes

Chao Zhang

API7.ai Technical Expert

APACHE APISIX

About Me

- Apache APISIX PMC Member
- Contributor of Nginx, OpenResty, Ingress Nginx and so on
- API7.ai technical expert, Head of API7 Cloud product
- Focus on API Gateway, Service Mesh
- https://github.com/tokers

APACHE APISIX

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01 What is Apache APISIX

02 Tranditional Deployment Pattern

03 Deploy APISIX on Kubernetes

04 The Ingress Pattern

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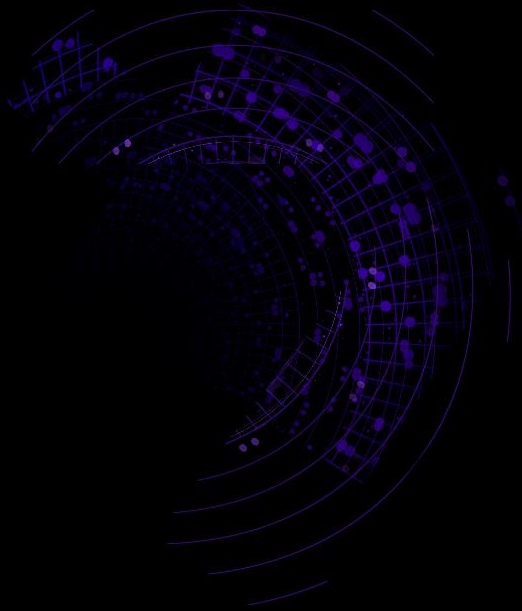


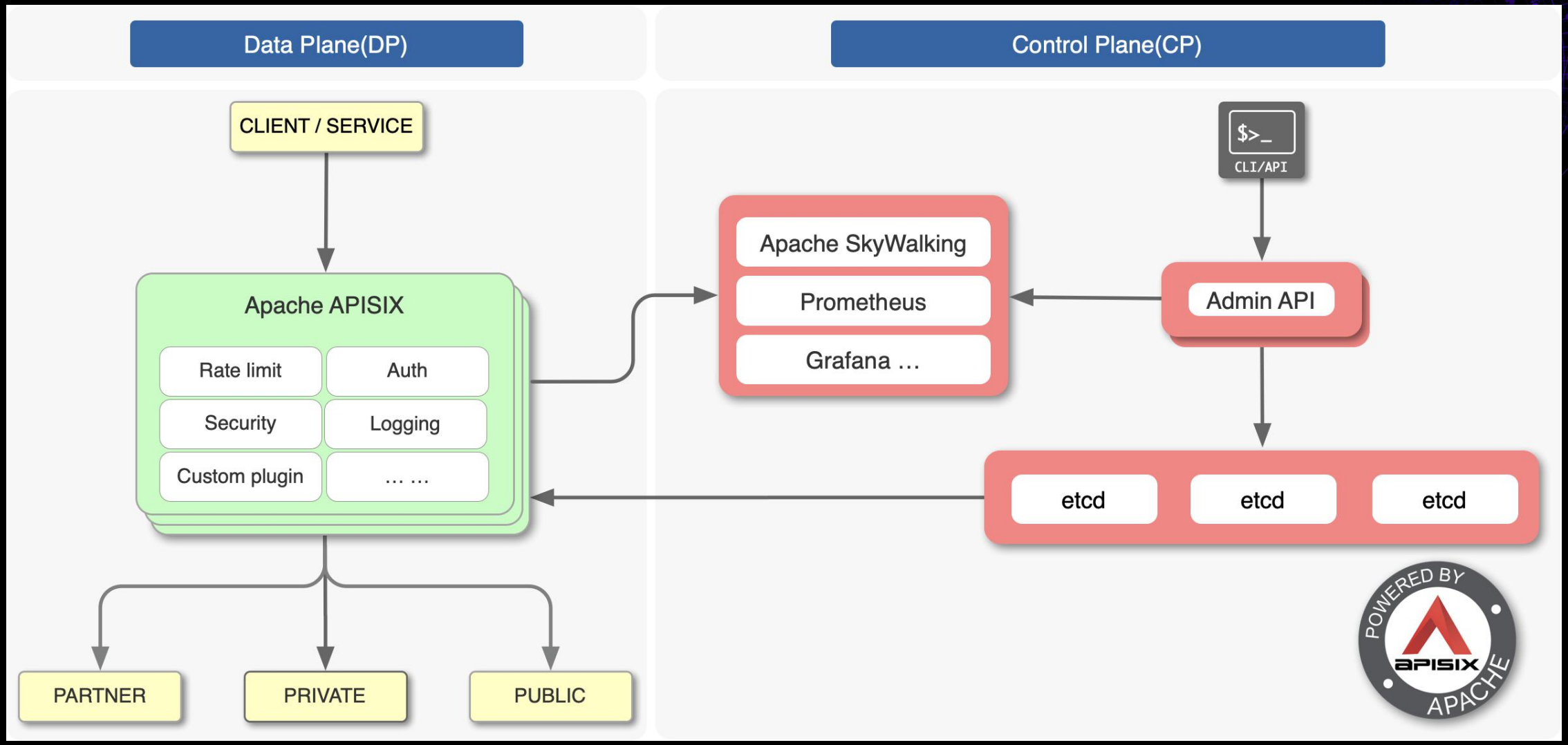
01 What is Apache APISIX

The Cloud-Native API Gateway

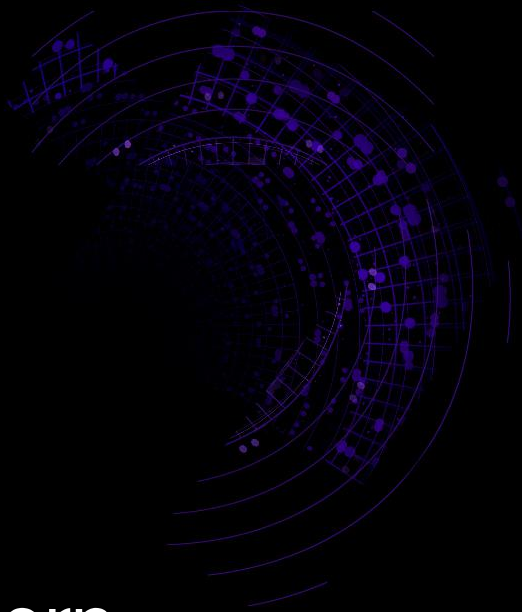
APACHE APISIX

What is Apache APISIX

- Cloud-Native API Gateway
- Provide features like traffic management, security, observability
- Hightly customizable, supporting WASM and Java, Go, Python plugin runners
- Strong ecosystem
- Healthy and active community
- https://apisix.apache.org/


Data Plane(DP)
Control Plane(CP)
CLIENT / SERVICE
Apache APISIX
Rate limit
Auth
Security
Logging
Custom plugin
… …
PARTNER
PRIVATE
PUBLIC
Apache SkyWalking
Prometheus
Grafana …
$>_
CLI/API
Admin API
etcd
etcd
etcd

APACHE APISIX



02 The Tranditional Deployment Pattern

How do we deploy Apache APISIX

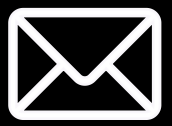
The Tranditional Deployment Pattern

Layer 4 LB

The Layer 4 LB distributes trafficto multiple Apache APISIX instances

Apache APISIX

Deploy APISIX on bare metal



Control Plane

An ETCD cluster and APSIX Dashboard

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The Tranditional Deployment Pattern

Cons

- Deployment / Configuration Change is duplicated, error-prone, and slow
- Environment might be shared, not immutable, resources are contended

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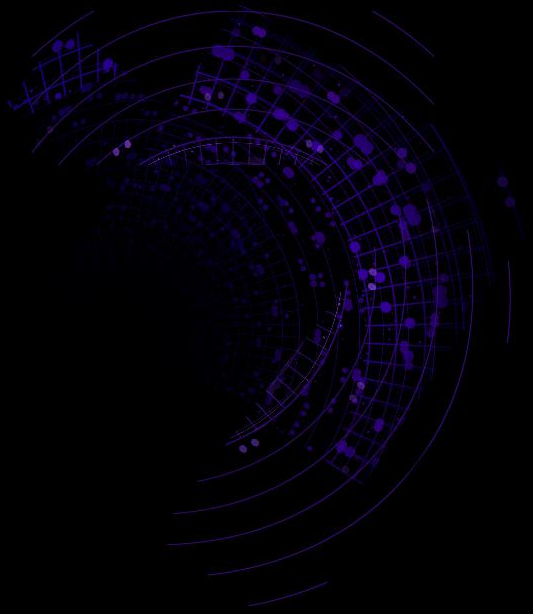

03 Deploy APISIX on Kubernetes

APACHE APISIX

Deploy APISIX on Kubernetes

Move from bare-metal to Kubernetes

- Expose APISIX service with the LoadBalancer/NodePort type
- Still use the APISIX Dashboard to manage APISIX
- (Optional) Deploy APISIX Dashboard and ETCD in Kubernetes

This way enjoys parts of Kubernetes advantages:

- Easy deployment, release and management
- Self-healing

But how to do the service discovery?

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Deploy APISIX on Kubernetes

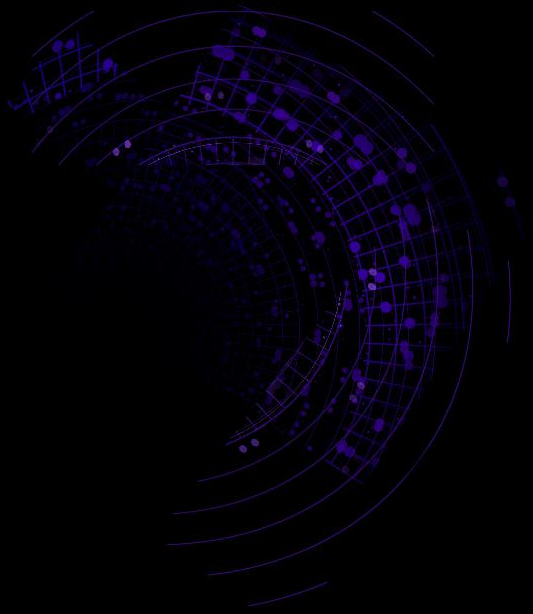
https://github.com/apache/apisix/blob/master/docs/en/latest/discovery/kubernetes.md

Since Apache APISIX 2.13.0, Kubernetes service discovery was supported.

But still, users configure APISIX in a slow way (using APISIX Dashboard)

How to use it declaratively?

APACHE APISIX



04 The Ingress Pattern

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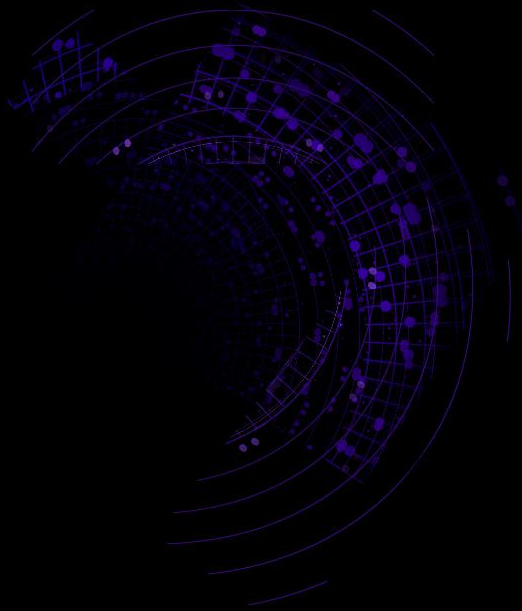
The Ingress Pattern

The Ingress resources (standard) are used to expose service from the Kubernetes cluster to outside, the Ingress Controller (implementation) uses the Ingress resources to provide the proxy functionality.

The definition of Ingress is not enough to satisfy most of scenarios, hence, a lot of Ingress Controllers design their own CRD (Custom Resource Defintion) to expose more traffic management features.

APACHE APISIX

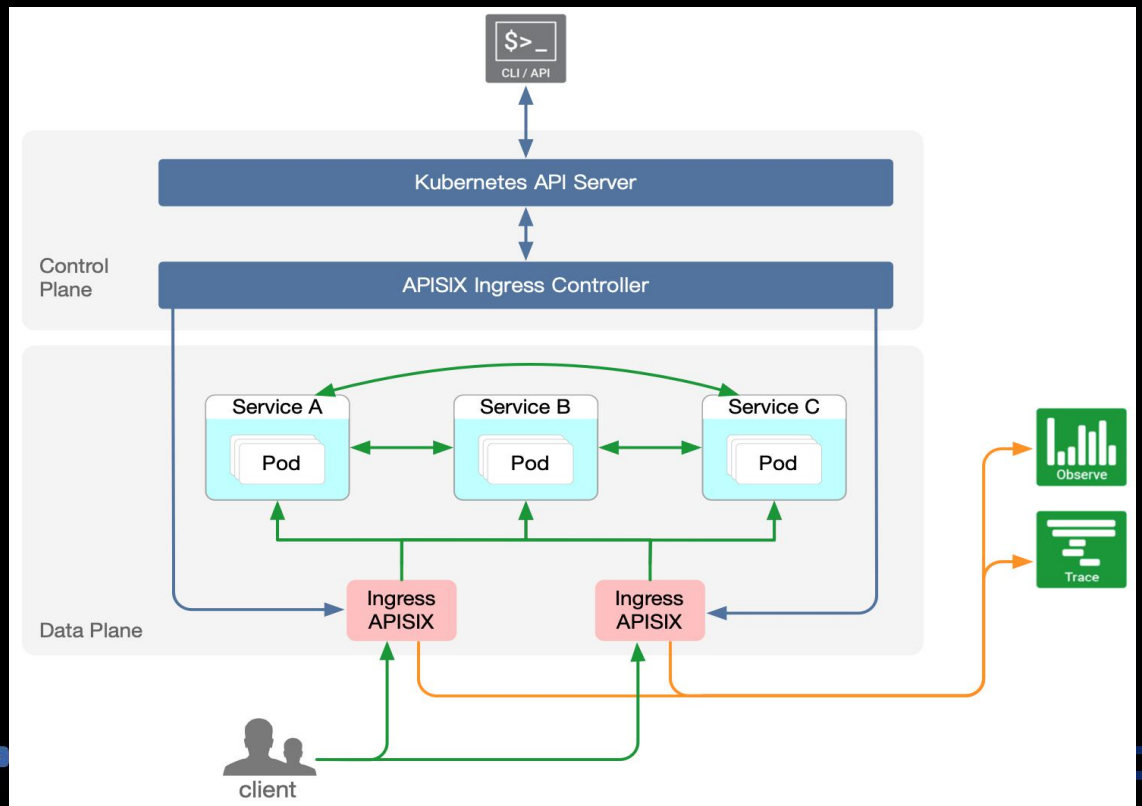


The Ingress Pattern

- Ingress Nginx
- Apache APISIX Ingress Controller
- Kong Ingress Controller
- Ambassador
- Traefik

The Ingress Pattern

APISIX Ingress Controller supports Ingress resource and its own CRD to configure APISIX, users configure APISIX in a declarative way and it's easy to update, integrate with other systems (e.g. CI/CD)



APACHE APISIX

The Ingress Pattern

ApisixRoute is the core reource in APISIX Ingress Controller, routes and the traffic management features are defined there.

```yaml
apiVersion: apisix.apache.org/v2beta2
kind: ApisixRoute
metadata:
  name: httpserver-route
spec:
  http:
  - name: rule1
    match:
      hosts:
      - local.httpbin.org
      paths:
      - /*
    backends:
       - serviceName: httpbin
         servicePort: 80

```

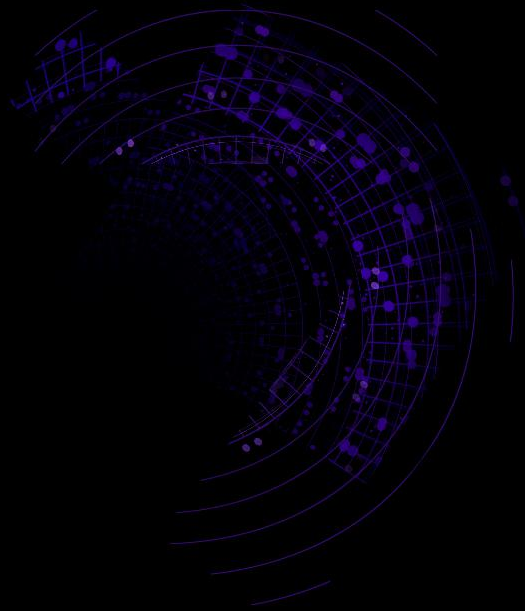
APACHE APISIX

The Ingress Pattern

Variations of using APISIX Ingress Controller

1. Deploy APISIX out of Kubernetes cluster but deploy Ingress Controller inside the cluster
2. Deploy APSIX in the Kubernetes cluster but deploy Ingress Controller out of the cluster
3. Deploy both the APISIX and Ingress Controller out of the cluster

APACHE APISIX



The Ingress Pattern

Variation - Use APISIX as the Istio Ingress Gateway

APISIX can also plays the role of the Ingress Gateway in the Istio, so that users can use another solution as the Service Mesh Gateway instead of using Envoy.

https://apisix.apache.org/blog/2021/12/17/exposure-istio-with-apisix-ingress/

APACHE APISIX

The Ingress Pattern

The APISIX Ingress Controller architecture is not simple, user still need an ETCD cluster.

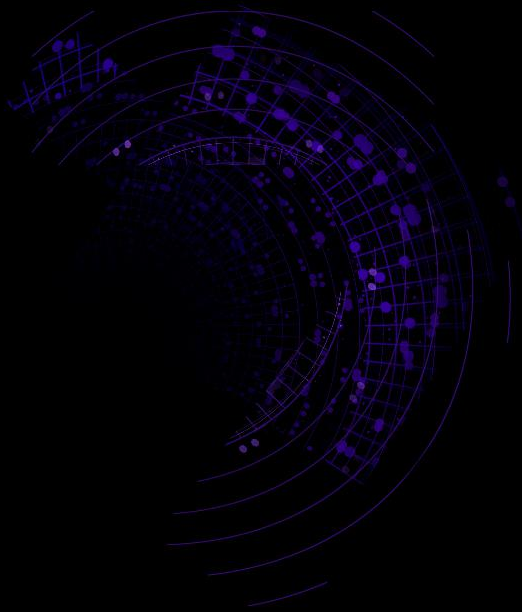
Use https://github.com/api7/etcd-adapter to mimic the ETCD APIs, packaging Ingress Controller and APISIX in an image, that'd another variation with less friction.

APACHE APISIX

The Ingress Pattern

The APISIX Ingress Controller CRD is not portable, users prefer standard way - Gateway APIs.

APACHE APISIX



THANKS!