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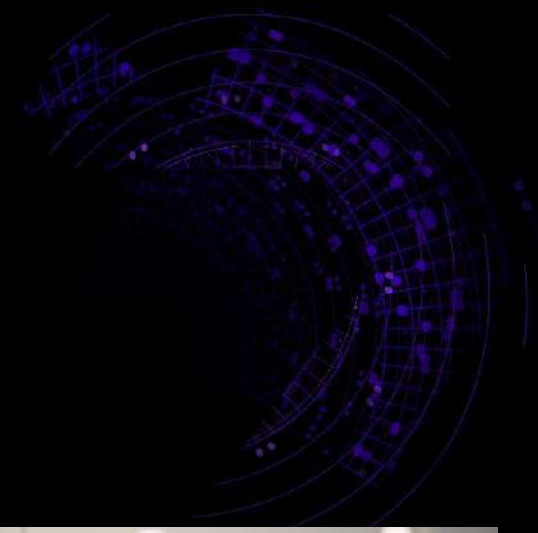
Use Apache APISIX on Kubernetes

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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>





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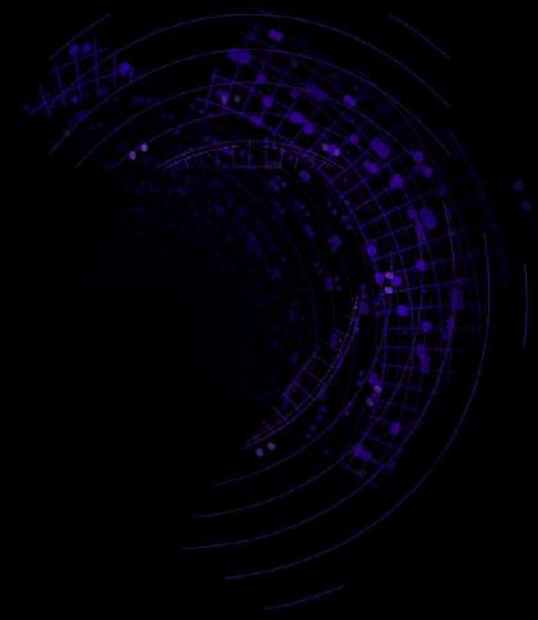


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- 02 Traditional Deployment Pattern
- 03 Deploy APISIX on Kubernetes
- 04 The Ingress Pattern



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01

What is Apache APISIX

The Cloud-Native API Gateway

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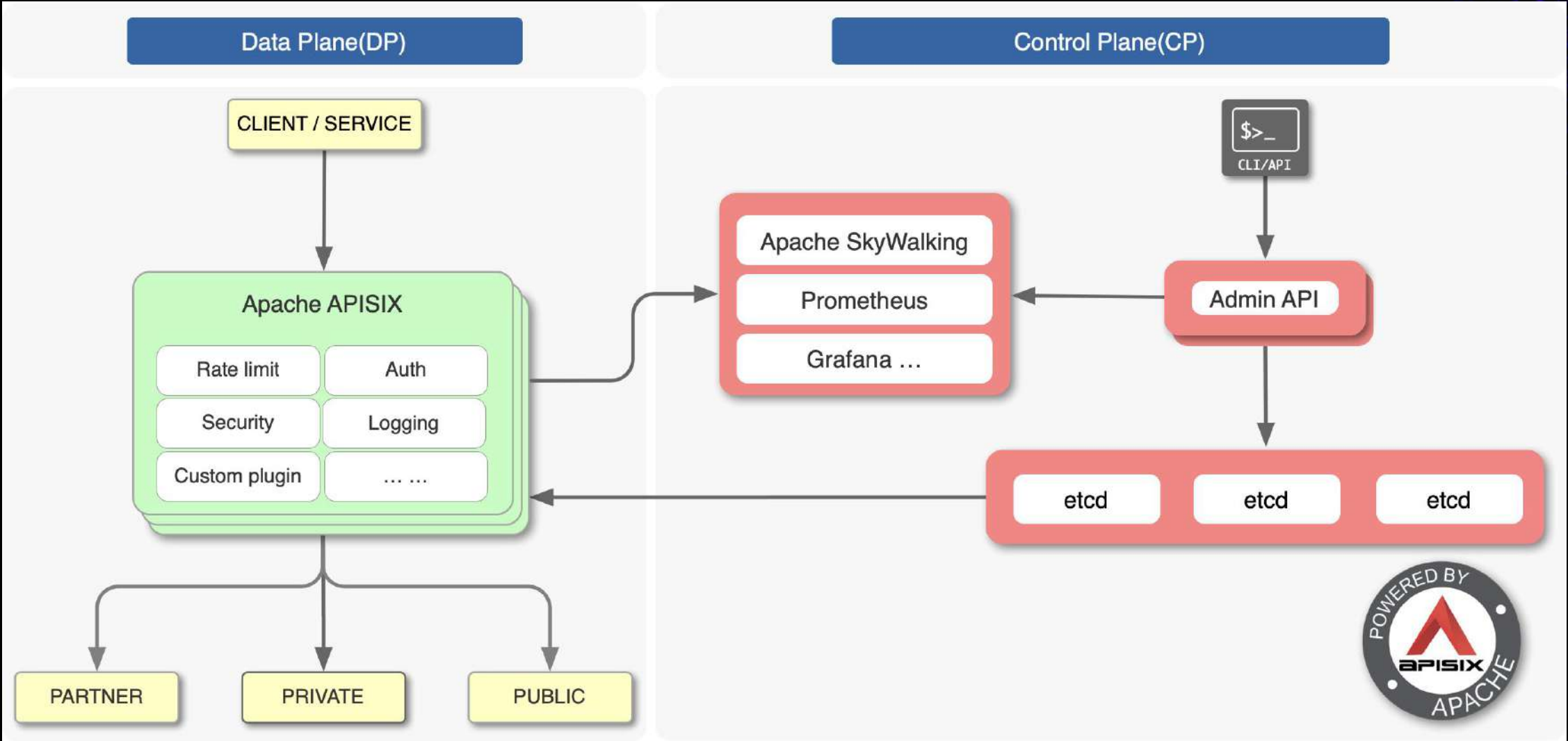
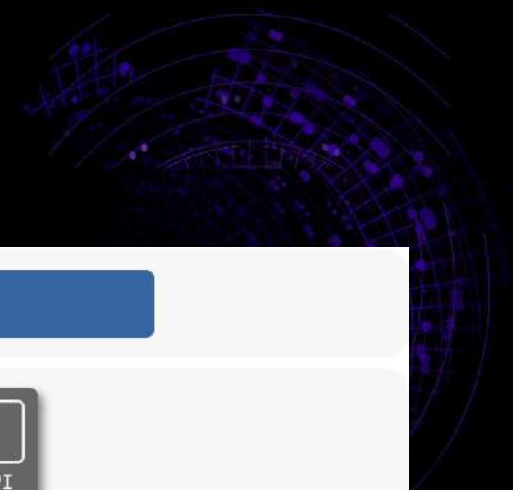


What is Apache APISIX

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



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02 The Traditional Deployment Pattern

How do we deploy Apache APISIX



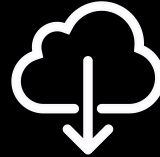
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The Traditional Deployment Pattern



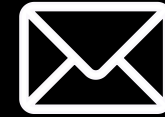
Layer 4 LB

The Layer 4 LB distributes traffic to multiple Apache APISIX instances



Apache APISIX

Deploy APISIX on bare metal



Control Plane

An ETCD cluster and APISIX Dashboard





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The Traditional 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



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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

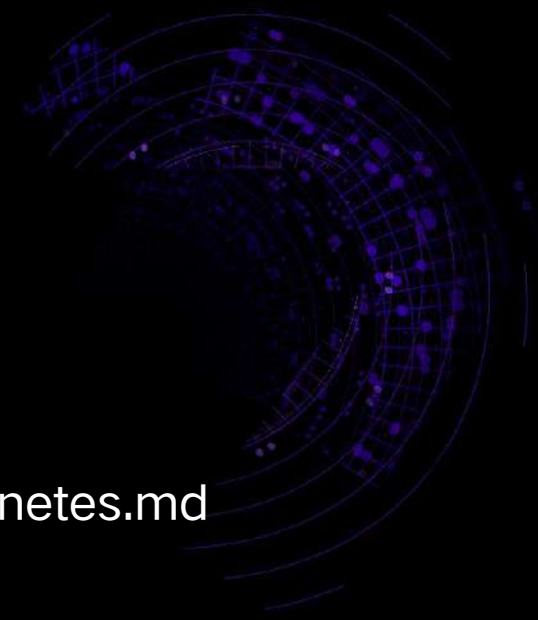
This way enjoys parts of Kubernetes advantages:

- 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?



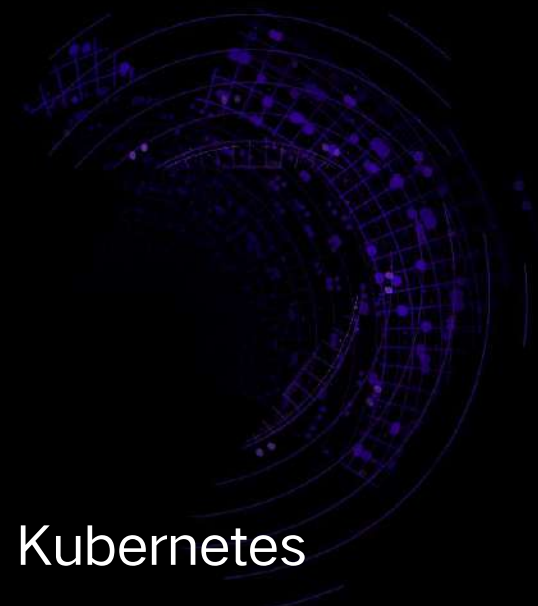
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04 The Ingress Pattern



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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 Definition) to expose more traffic management features.



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The Ingress Pattern

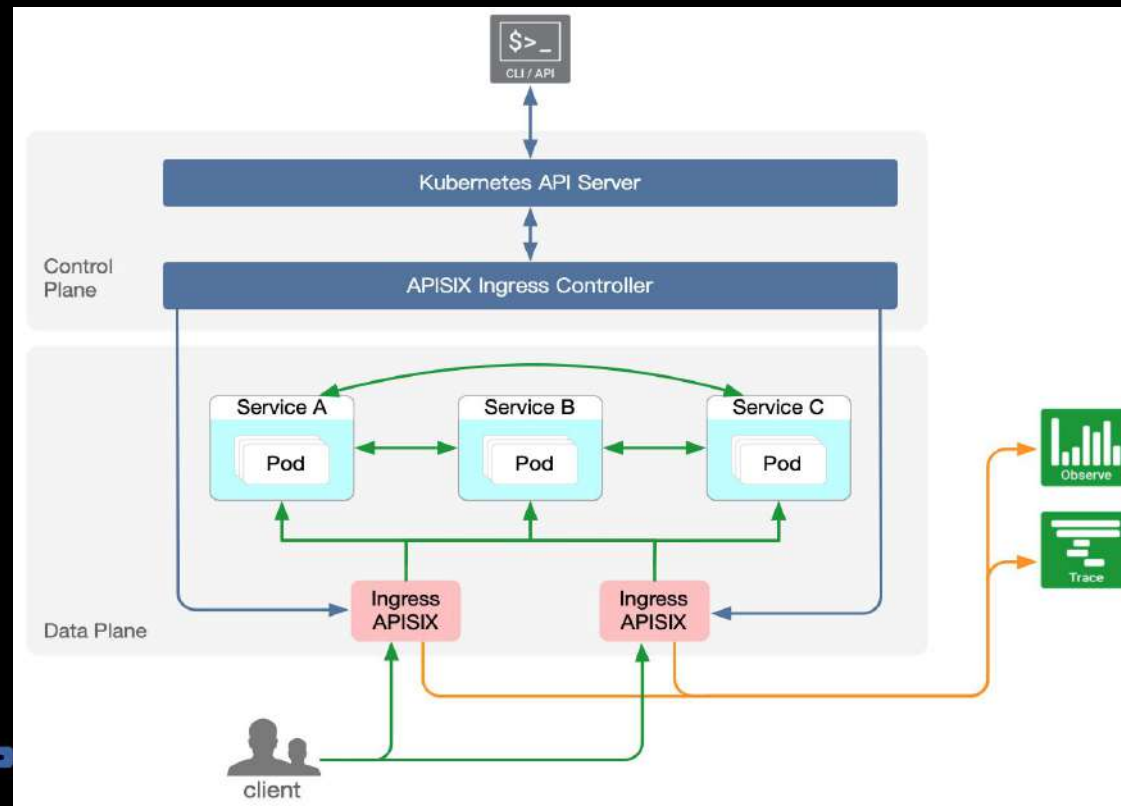
- Ingress Nginx
- Apache APISIX Ingress Controller
- Kong Ingress Controller
- Ambassador
- Traefik



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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)





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The Ingress Pattern

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

```
1 apiVersion: apisix.apache.org/v2beta2
2 kind: ApisixRoute
3 metadata:
4   name: httpserver-route
5 spec:
6   http:
7     - name: rule1
8       match:
9         hosts:
10          - local.httpbin.org
11         paths:
12          - /*
13       backends:
14         - serviceName: httpbin
15           servicePort: 80
16
```



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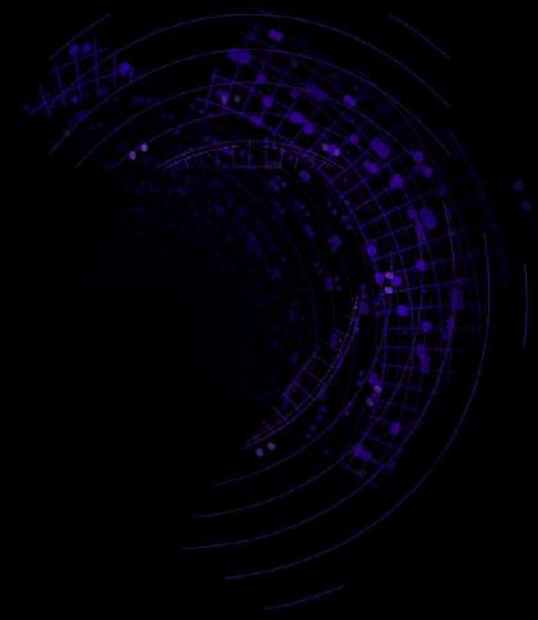
The Ingress Pattern

Variations of using APISIX Ingress Controller

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



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The Ingress Pattern

Variation - Use APISIX as the Istio Ingress Gateway

APISIX can also play 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/>



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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.



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The Ingress Pattern

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



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THANKS!

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