



台灣積體電路製造股份有限公司  
Taiwan Semiconductor Manufacturing Company, Ltd.

2022 TSMC IT  
**KUBERNETES SUMMIT**  
Cloud Native Event

**打造新世代運算平台  
加速推動數位轉型**

資料及平台部 | 吳聲葆 Nelson 經理  
October 18, 2022

# TSMC IT as a Partner of Kubernetes Summit



吳聲葆 Nelson  
台積電  
資料及平台部 經理

## 講者簡介

為台積首批容器化應用平台推廣團隊成員之一，負責建置包含 VM、Kubernetes、Serverless 以及 MLOP 的運算平台，也是最早將 GitOps 持續交付方式引進 TSMC IT CI/CD 流程。對新技術的學習與推廣充滿熱情，曾經是 Kubernetes Summit 多場活動的台下觀眾，很榮幸能跟大家分享推廣 K8s 平台的心路歷程。

## 打造新世代運算平台，加速推動數位轉型 [↗](#)



CI/CD

企業 K8s 實例

雲端原生架構

架構遷移



中階

中文

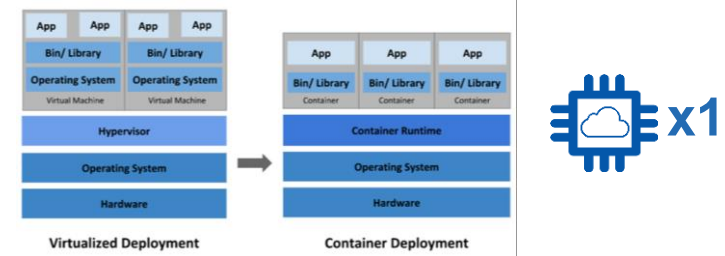
台積電正積極導入 ML/AI 與新數位科技，加速全面性的數位轉型。TSMC IT 正打造新世代的運算平台、透過容器化技術與整合 CI/CD 流程，支持數位應用的運算需求，並且簡化維運的複雜度。本議程將與大家分享：

1. 為何需要新的運算平台？
2. DevOps 需要 software-defined platform (compute / network / storage)
3. GitOps 持續交付整合 CI/CD 流程
4. TSMC IT Kubernetes 平台技術分享

# TSMC IT Private Cloud Journey

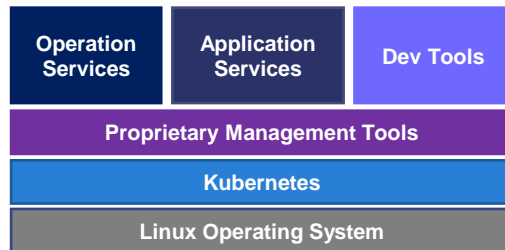
~2018

VM-based computing environment with piloting containerization



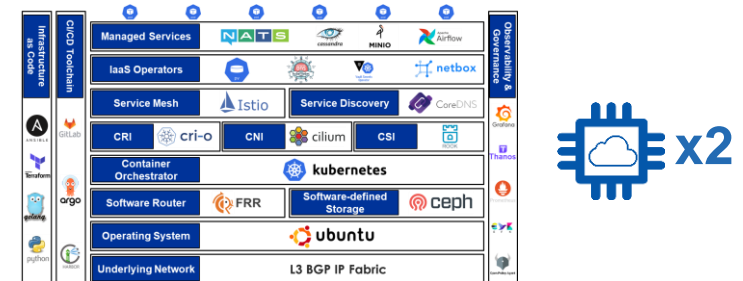
2020

Commercial container platform



2022

Full-stack open source container platform





# CNCF Cloud Native Trail Map

TSMC IT embraces open source & cloud native technologies to build and run applications on the Kubernetes platform.

Step by step:

1. Containerization;
2. CI/CD;
3. Orchestration & application definition;
4. Observability & analysis;
5. Service proxy, discovery & mesh;
6. Networking, policy & security;
7. Distributed database & storage;
8. Streaming & messaging;
9. Container registry & runtime;
10. Software distribution.



## CLOUD NATIVE TRAIL MAP

The Cloud Native Landscape (CNL) has a large number of options. The Cloud Native Trail Map is a recommended approach for leveraging open source, cloud native technologies. At each step, you can choose a vendor-supported offering or do it yourself, and everything after step #9 is optional based on your circumstances.

### HELP ALONG THE WAY

#### A. Training and Certification

Consider training offerings from CNCF and then look for courses to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer. [cncf.io/training](https://cncf.io/training)

#### B. Consulting Help

If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider. [cncf.io/adopt](https://cncf.io/adopt)

#### C. Join CNCF's End User Community

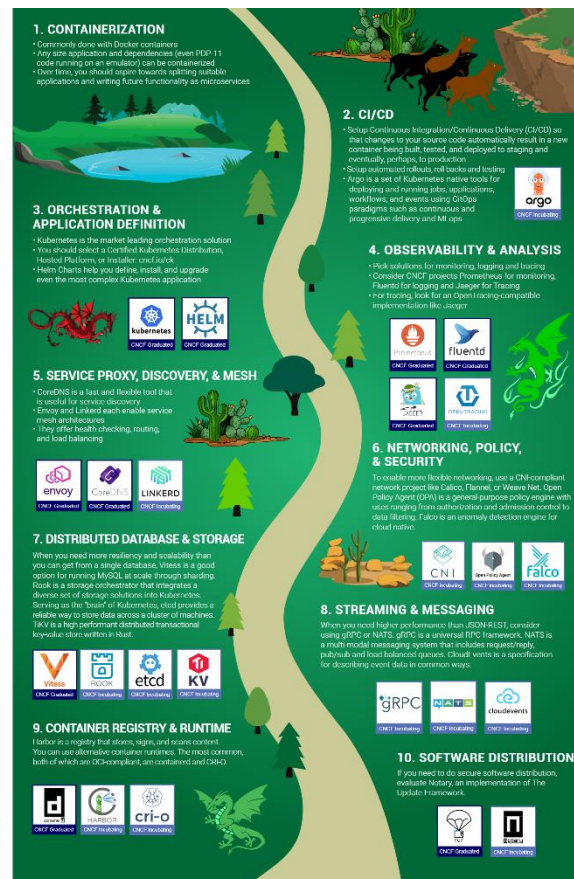
For companies that don't offer cloud native services externally. [cncf.io/adopt](https://cncf.io/adopt)

### WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high impact changes frequently and predictably with minimal toil.

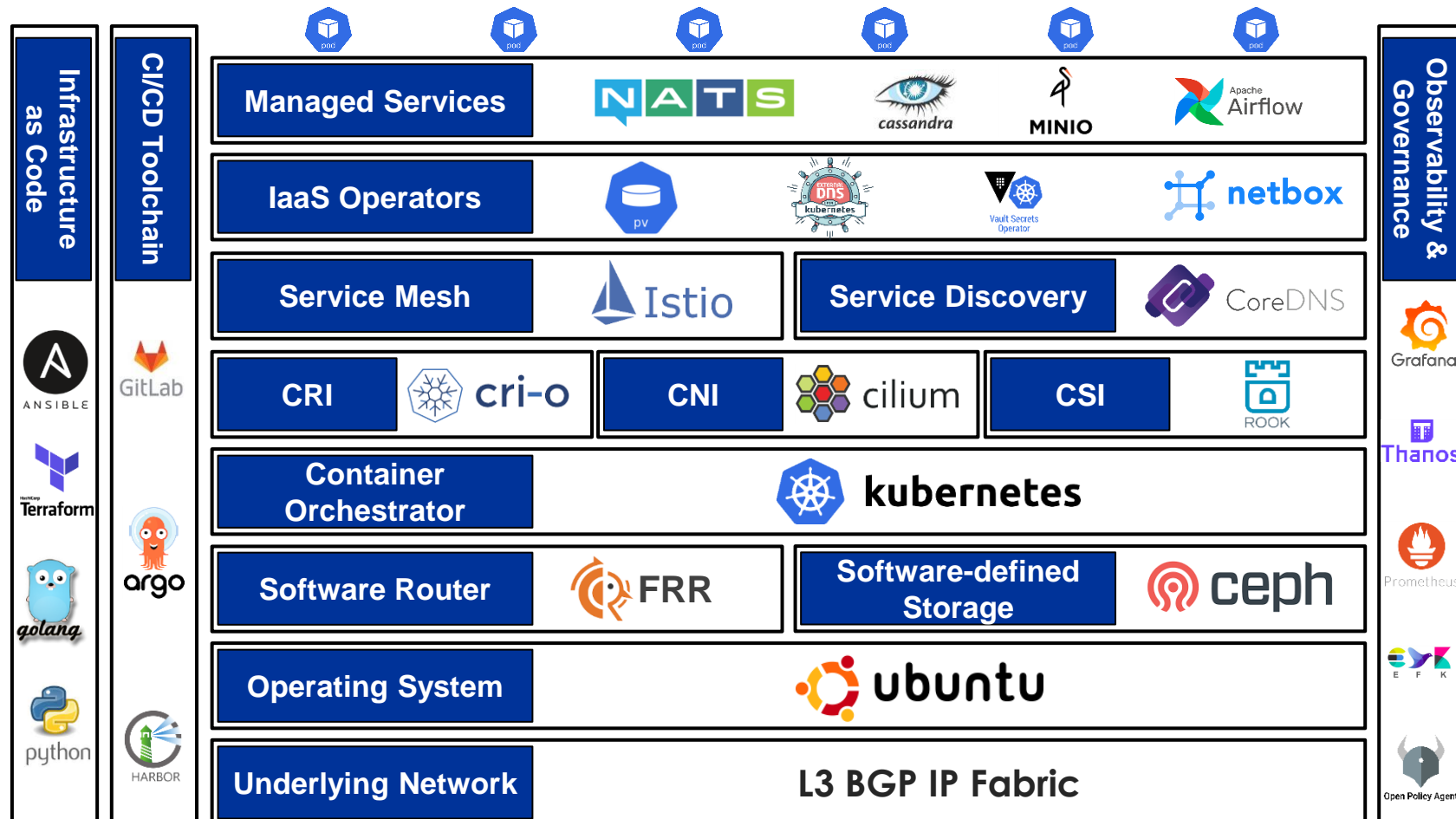
The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor neutral projects. We demonstrate state-of-the-art patterns to make these innovations accessible for everyone.



<https://github.com/cncf/trailmap>

# K8s Computing Stacks based on Open Source

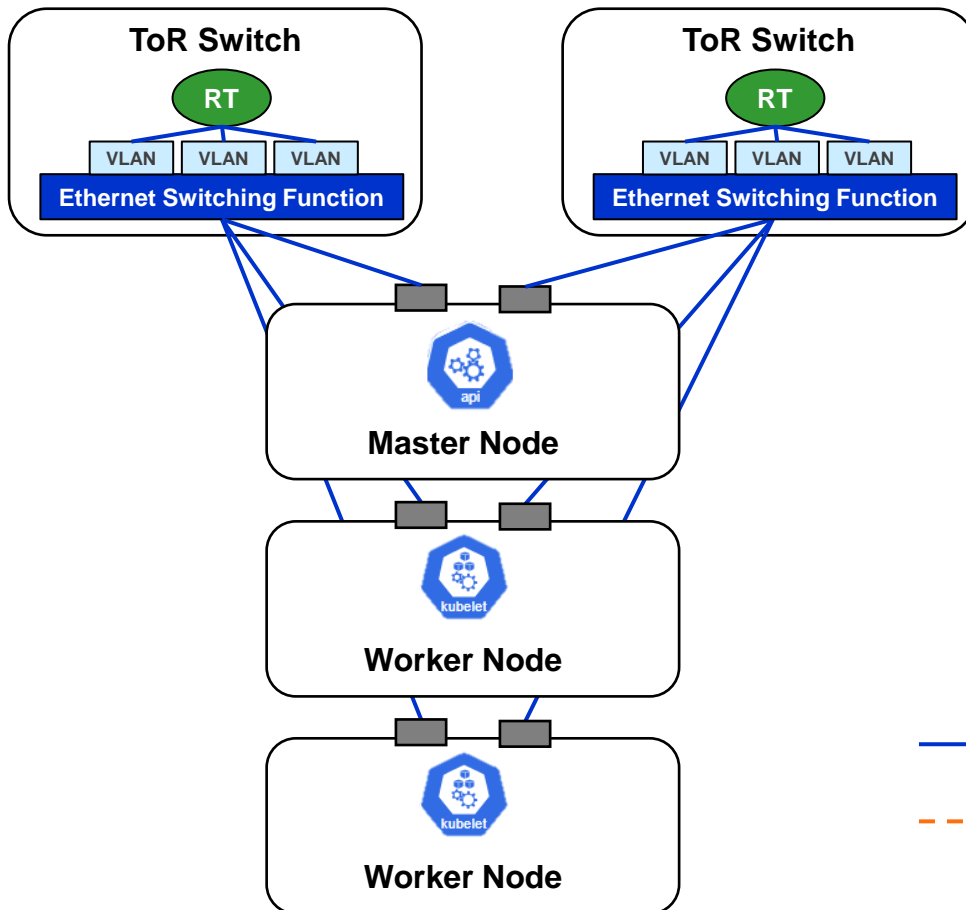
TSMC IT builds Kubernetes platform from the ground up by open source technologies to provide software-defined compute / storage / network resources.



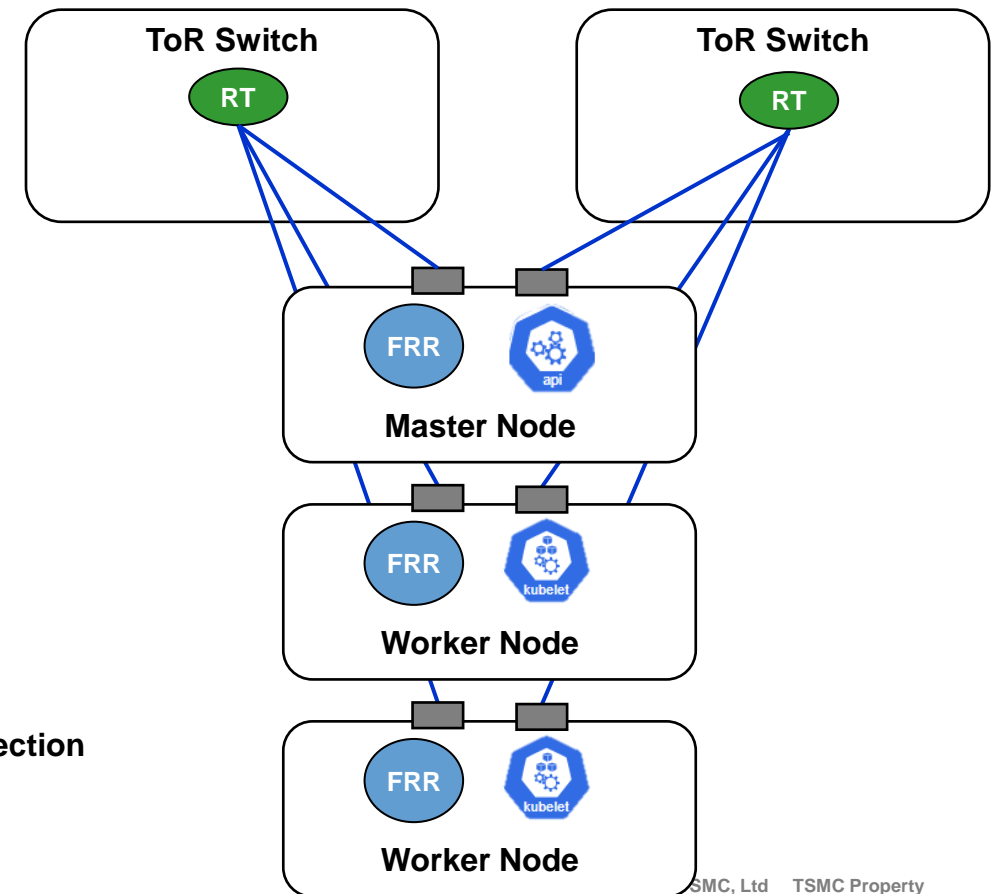
# The Foundation of Kubernetes – Networking

Each K8s node over the L3 BGP IP fabric is a router which is capable of native routing and advertising IP directly without the limitation of layer 2 network boundary.

## L2 Ethernet Fabrics



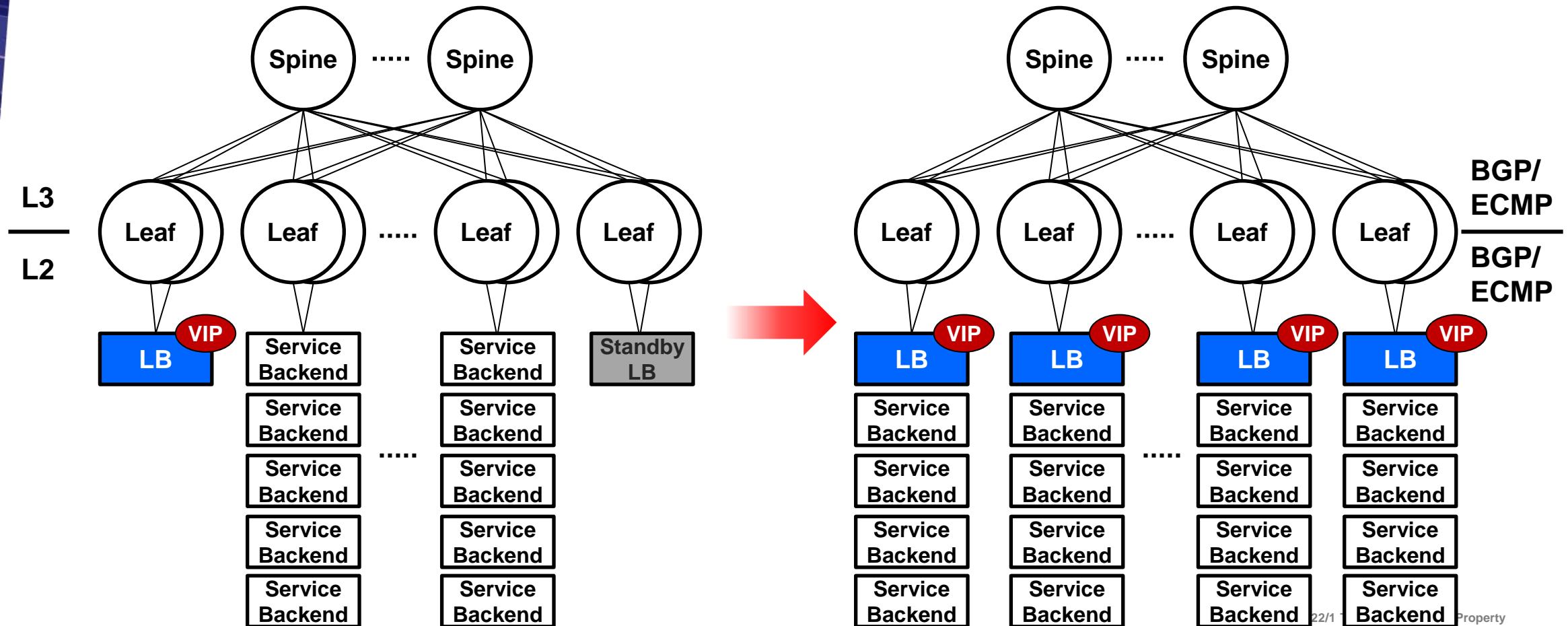
## L3 IP Fabrics



- Ethernet Connection
- - - BGP Peering

# Load Balancer over BGP/ECMP

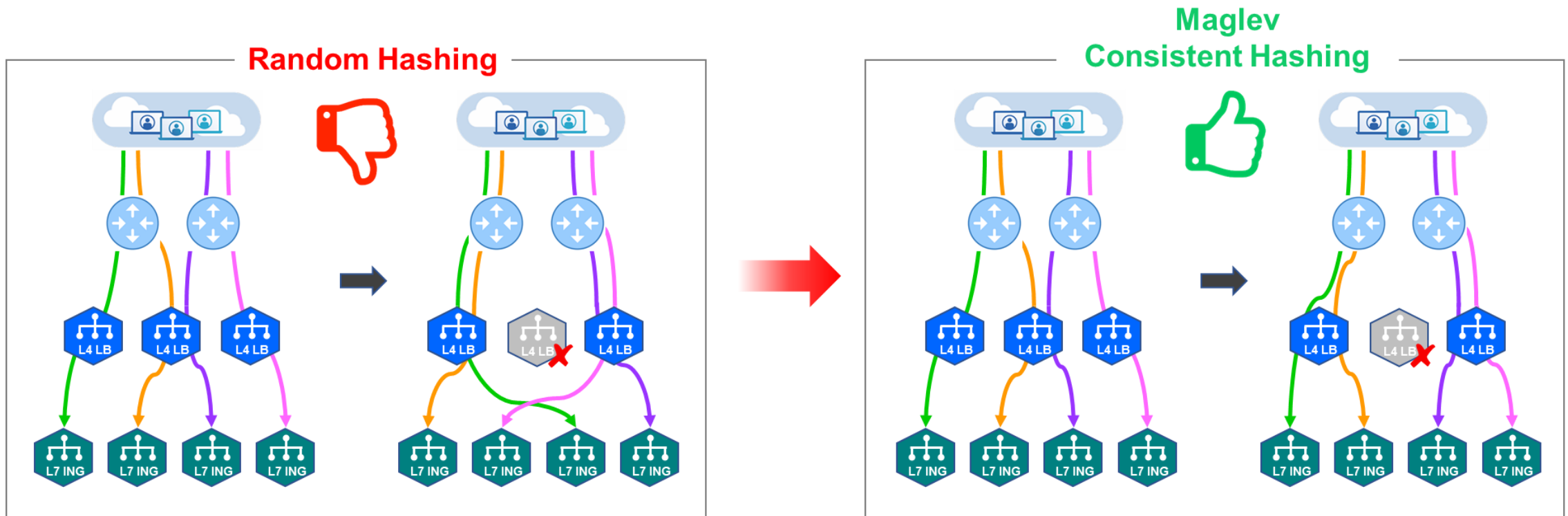
Multi-active software-based L4LBs are built and placed in front of L7 ingress controllers to provide high scalable and available ingress channels.





# L4 Load Balancer with Maglev and DSR

The L4 LB has built-in Maglev and DSR, which allows the connection to L7 ingress controller to keep connected even if the L4LB on the path is down.

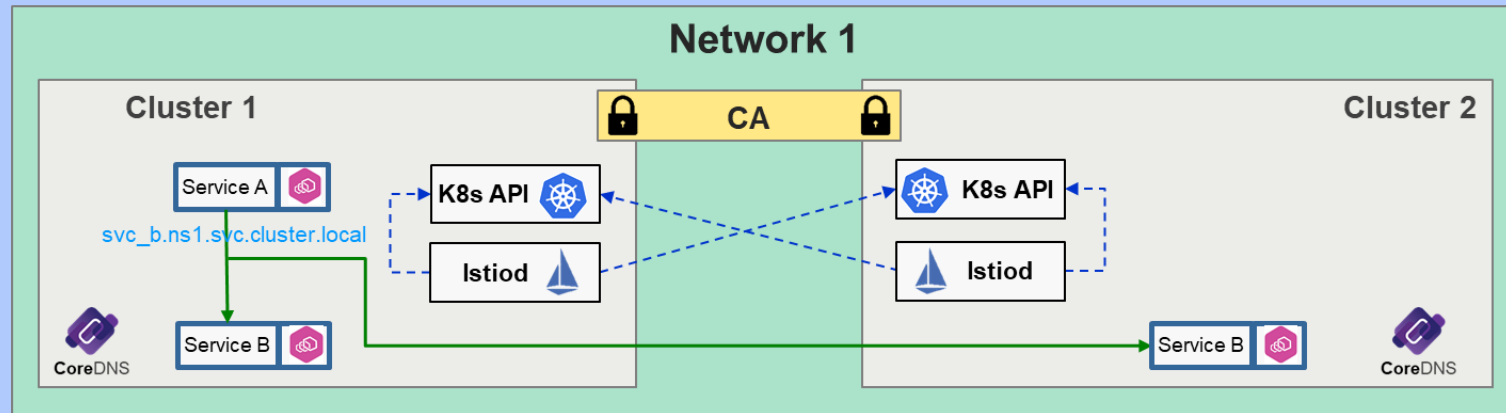




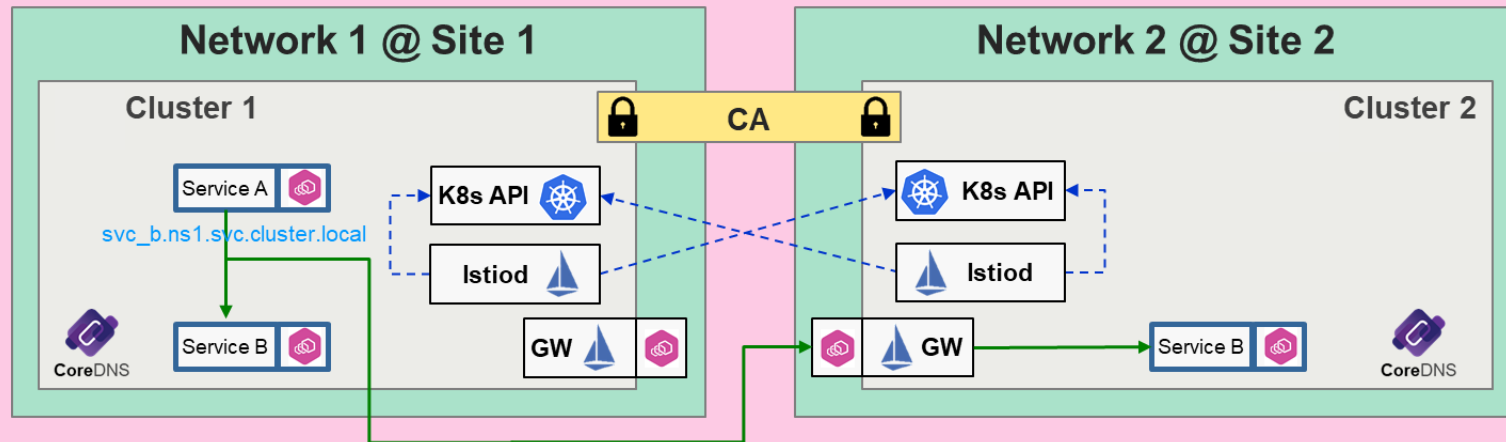
# Service Mesh by Istio

Service Mesh enabling for app transformation from monolithic to microservices by facilitating the management of microservices routing, tracing, security, canary rollout, A/B test, and cross-cluster failover.

## Multi-Cluster Service Mesh over Single Network



## Multi-Cluster Service Mesh over Multi-Network

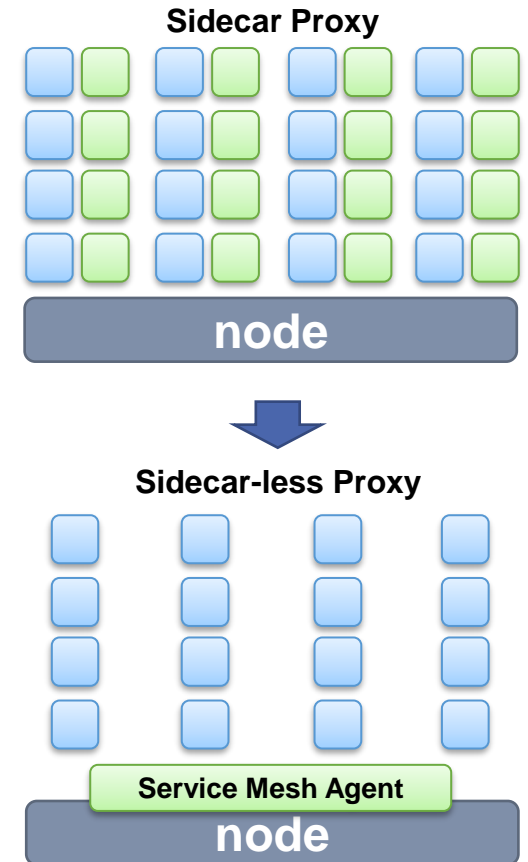
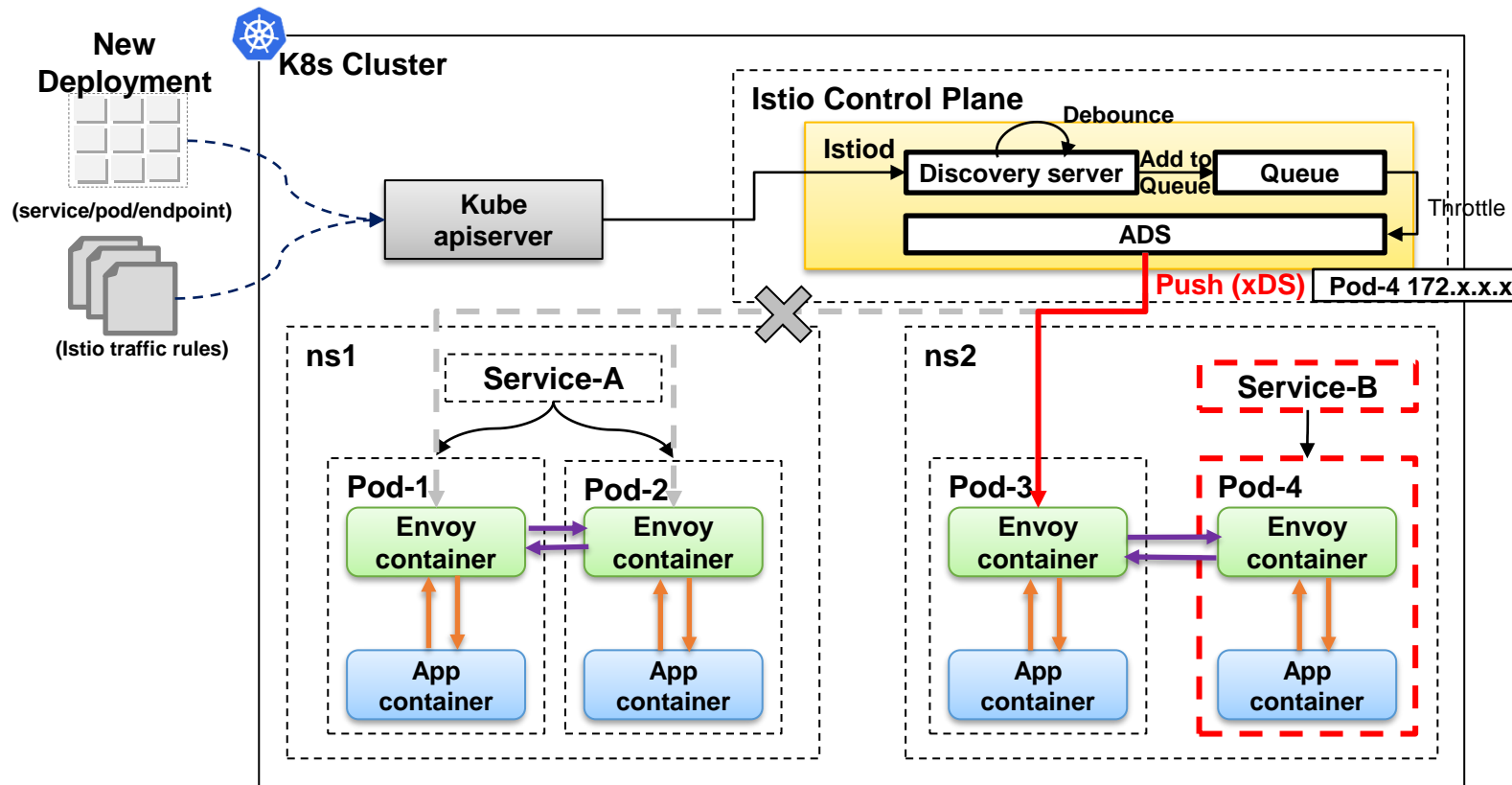


# Istio Proxy Experience Sharing

When Istio is deployed in a larger K8s cluster shared by several teams, proxy sidecars in each pod may consume excessive memory as Istiod pushes all traffic management information to them.

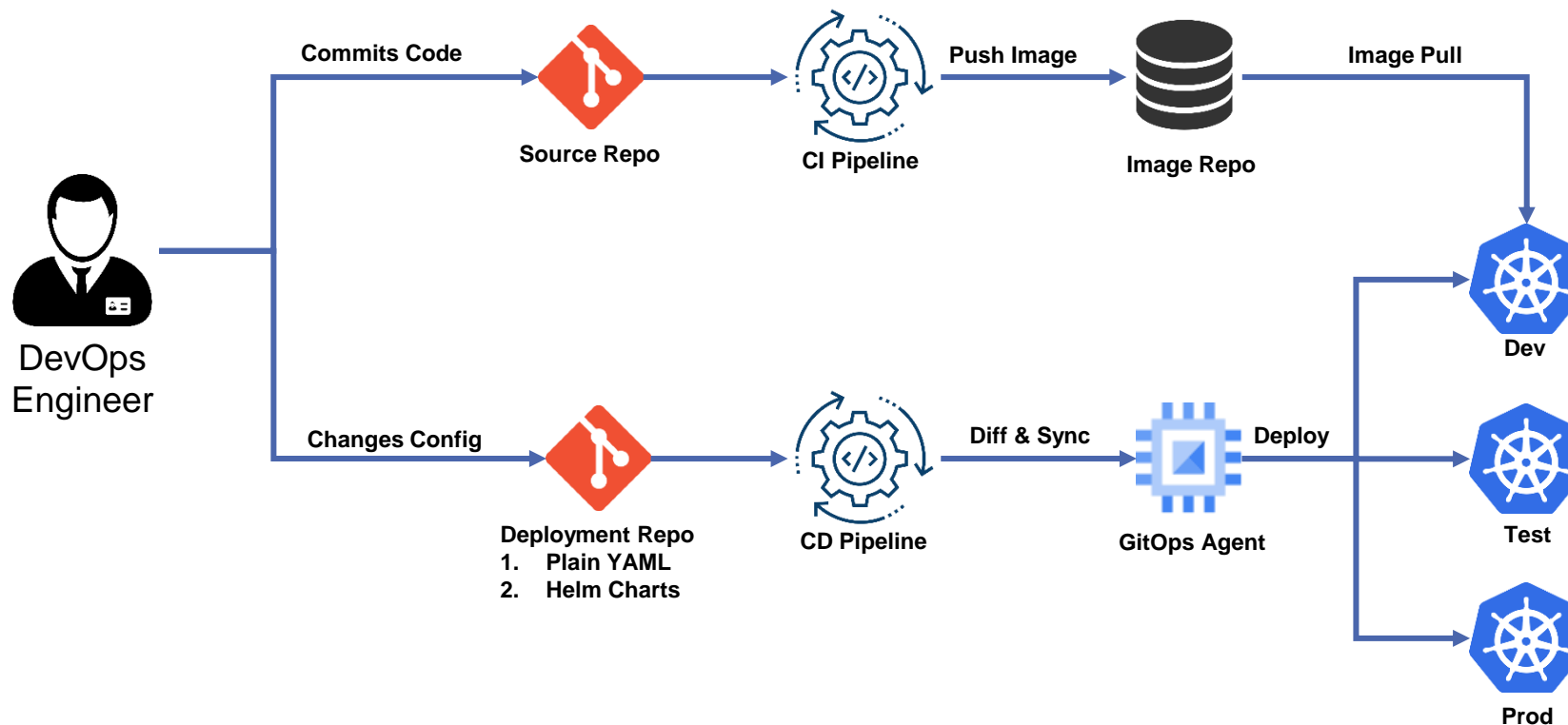
Quick fix: Use Sidecar CRD to limit push scope.

Next step: Adopt sidecar-less service mesh with agent on node.



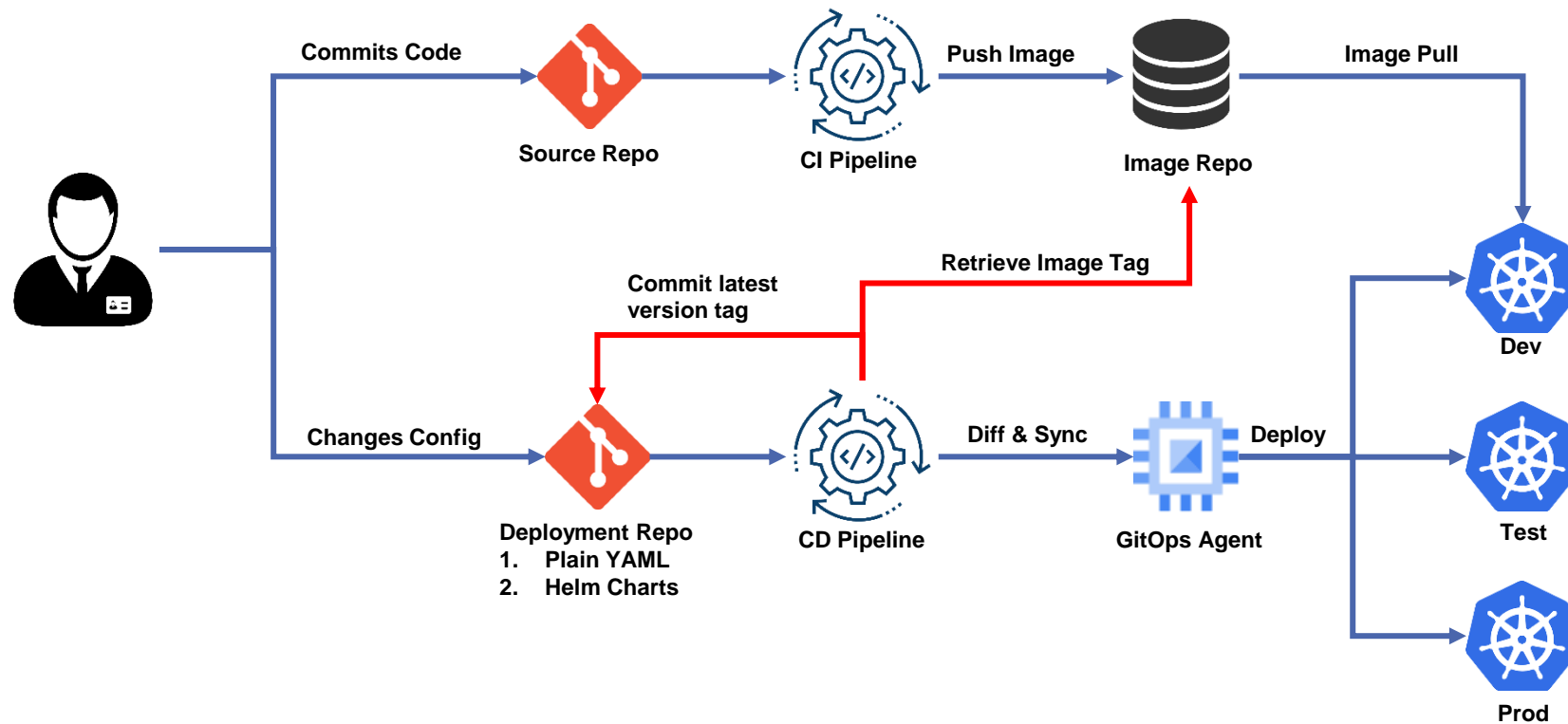
# GitOps Continuous Delivery

GitOps release pipeline to empower DevOps/SRE to automate release / changes declaratively, subject to the same PR and peer review process as application code, increasing deployment productivity and quality.



# Image Auto Patching Mechanism

Enhanced GitOps CD capability to auto patch image tag from image repo's latest version for continuous app release, especially for development iteration.

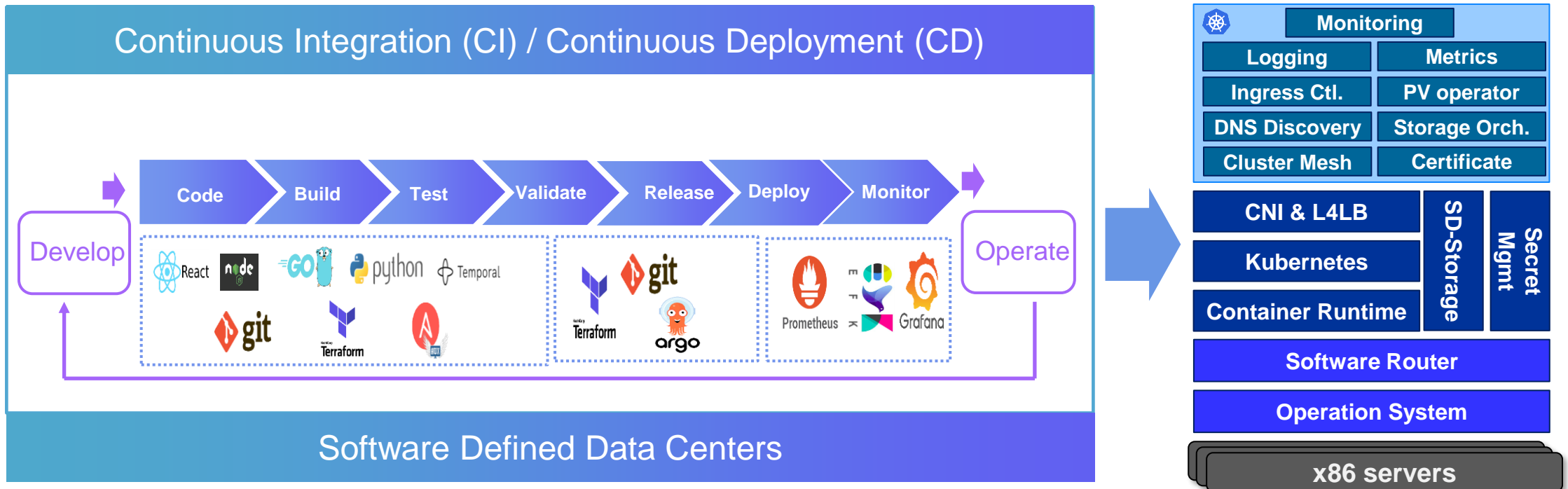




# Infrastructure as Code Realization

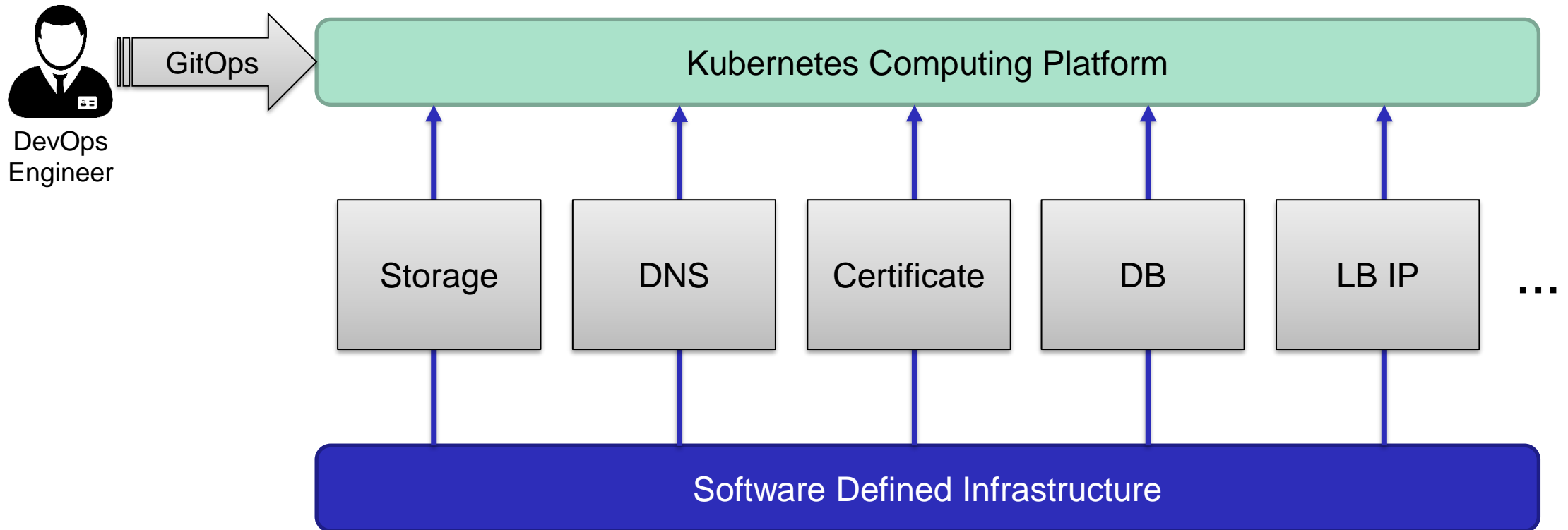
Adopt “infrastructure as code” approach to provision the complete Kubernetes platform from the bare-metal servers in a full-automated way: Day-1 deployment and Day-2 operations.

Reduce cluster provisioning cycle time by >90%.



# Declarative Deployment for App & Services

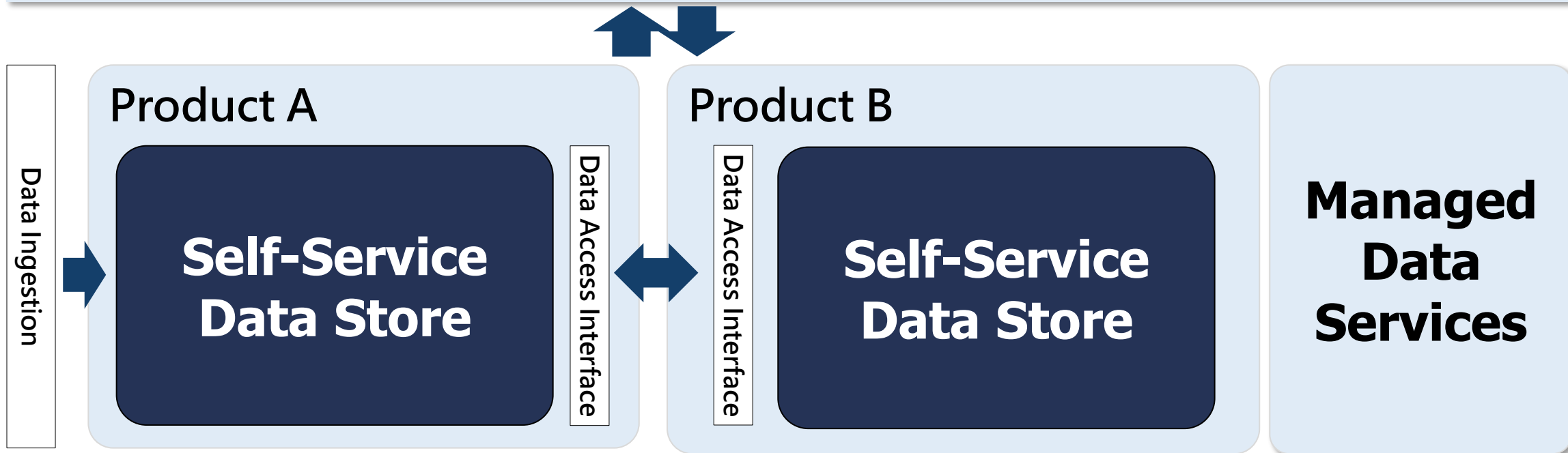
In addition to K8s compute resources, DevOps engineers are able to invoke IaaS providers declaratively to acquire services required to make applications runnable, discoverable and accessible.



# Next-Gen Data Platform

Based on domain-driven design, adopt distributed database and storage solutions with global governance & open standard.

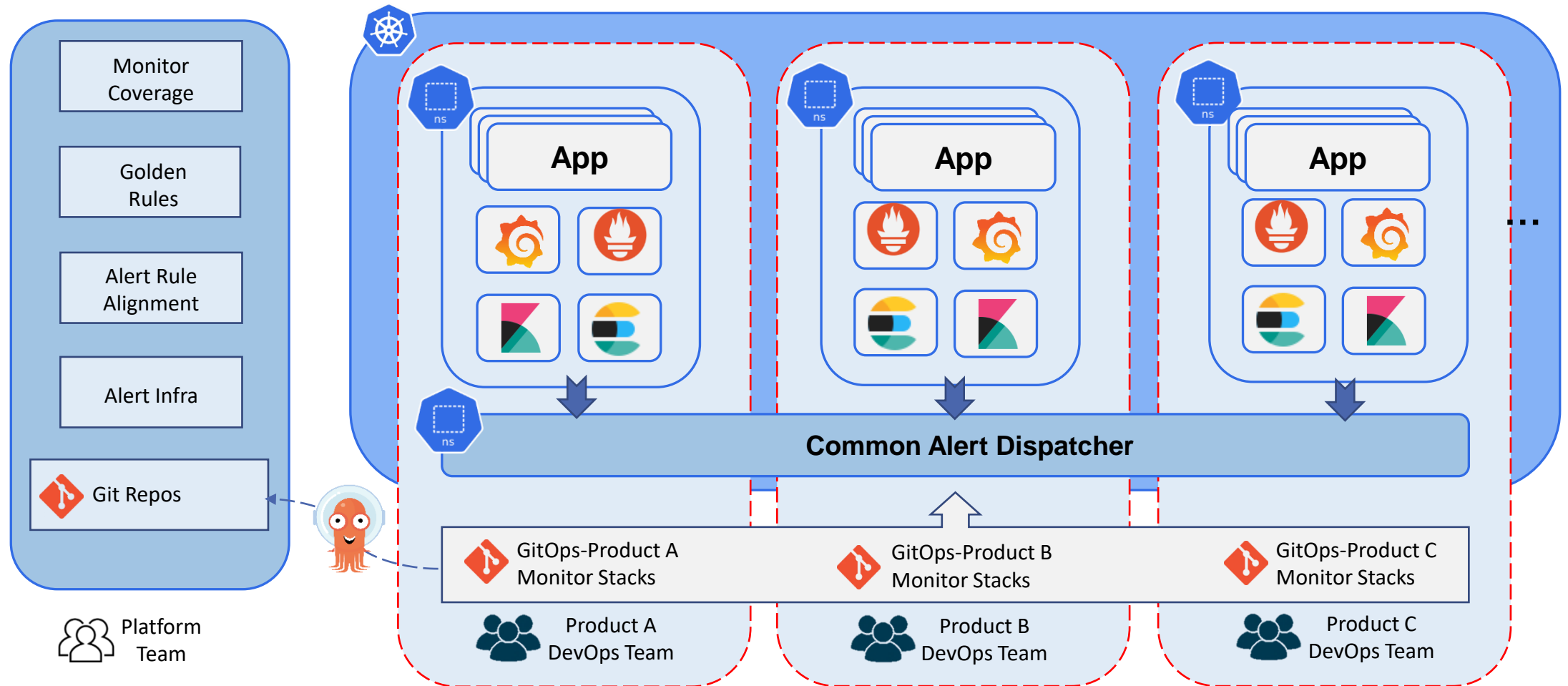
## Global Governance & Open Standard



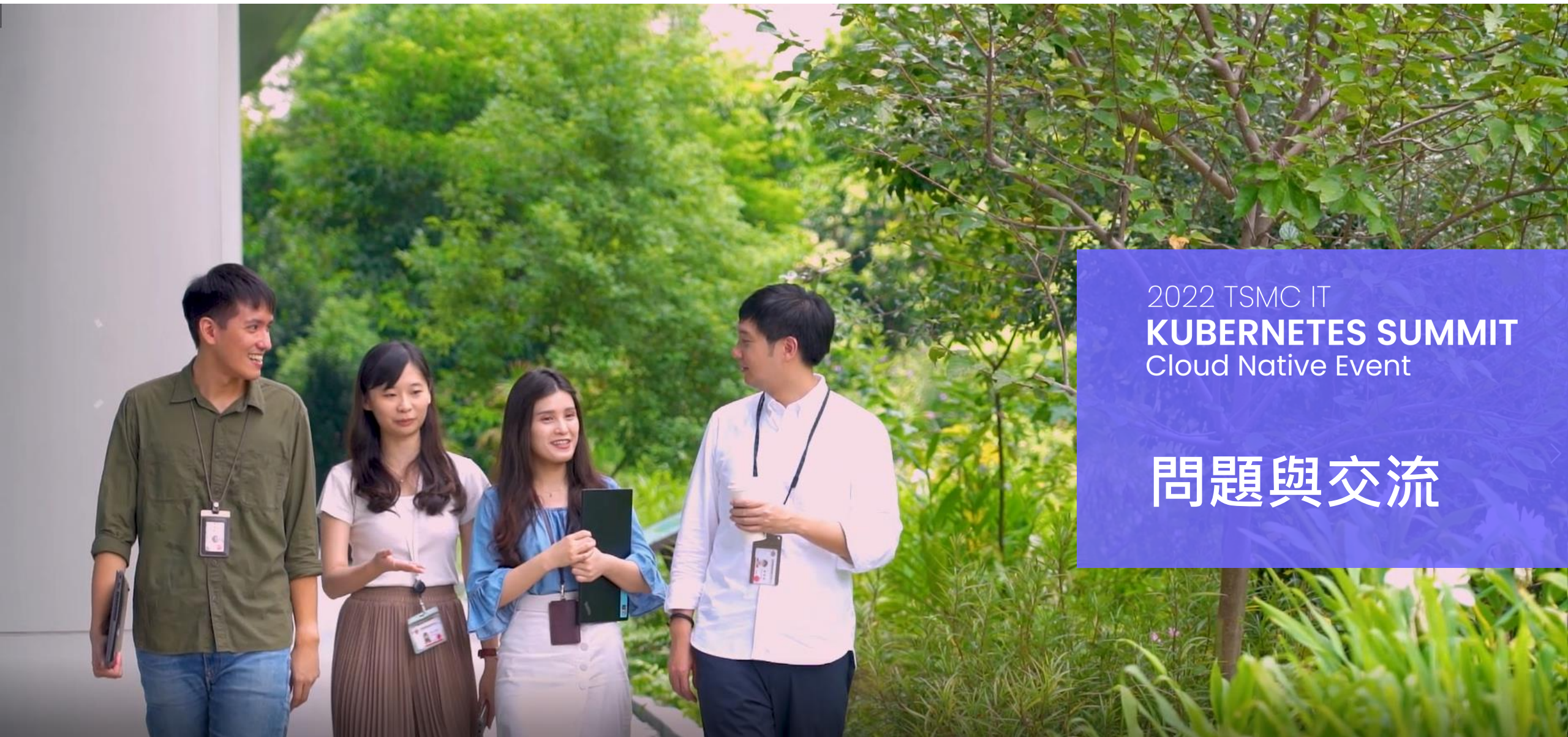
## Data Infrastructure as a Platform

# Product-based Monitoring Stacks

Deploy applications along with monitoring spec. by each product teams using GitOps approach by own monitoring stacks based on standardized templates.







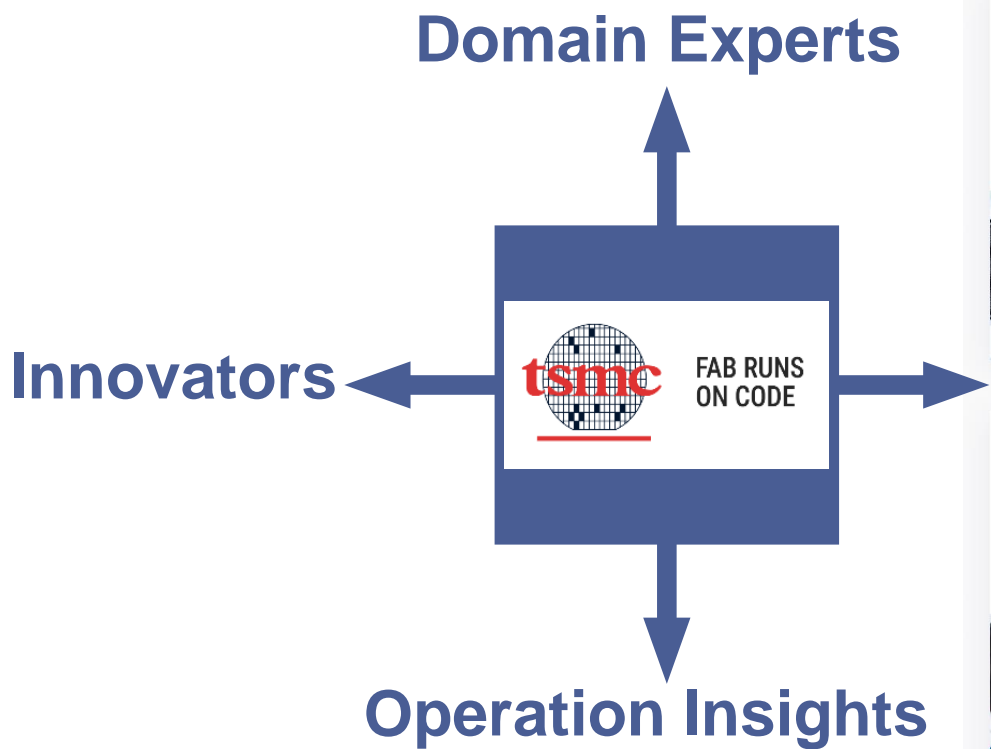
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**問題與交流**



# Welcome to talk with us !

## 技術交流 攤位 No. 2



 <b>Software Engineer</b> 軟體工程師 Building world-class cloud native infrastructure and ramping to... <input type="checkbox"/>	 <b>Site Reliability Engineer</b> 網站可靠性工程師 We are looking for a highly motivated and critical-thinking... <input type="checkbox"/>	 <b>DevOps Engineer</b> 開發維運工程師 TSMC IT is actively seeking software & DevOps engineers to... <input type="checkbox"/>	 <b>Data Engineer</b> 資料工程師 Are you a creative IT professional with strong technical aptitude... <input type="checkbox"/>
 <b>AI/ML Engineer</b> 人工智慧/機器學習工程師 TSMC AI team is developing the next-generation technologies... <input type="checkbox"/>	 <b>Infrastructure Engineer</b> 基礎架構工程師 We are seeking outstanding engineers to join TSMC IT... <input type="checkbox"/>	 <b>Front-End Developer</b> 前端開發工程師 TSMC IT is looking for a Front-End Web Developer with experience... <input type="checkbox"/>	 <b>UI/UX Designer</b> 使用者體驗工程師 TSMC IT is looking for an outstanding User Experience... <input type="checkbox"/>

如果您對我們的職缺有興趣，歡迎掃描 QR Code，  
留下您的聯絡方式及感興趣的職缺，我們將會與您聯絡！

# NOW 工作職缺 HIRING

- Product Manager
- Software Engineer (Frontend)
- Software Engineer (Backend)
- Site Reliability Engineer/Infrastructure Engineer
- AI/ML Engineer
- UX Designer

歡迎投遞履歷至 [JoinIT@tsmc.com](mailto:JoinIT@tsmc.com)，信件標題註明：  
「Kubernetes Summit 2022 應徵0000職缺」，我們將有專人與您聯絡



 Kubernetes  
Summit



# TSMC IT DAY

## 新技術架構交流與軟體人才對談

由台積電CIO、IT 組織中各領域的技術主管，以數位轉型、雲原生為題分享新技術架構，邀請各路軟體英雄、有經驗的IT相關人才前來與會

10 / 22 (六) | 10 / 29 (六) 9:30-14:30

報名截止日

活動時間

TICC台北國際會議中心 (台北市信義路五段1號)

活動地點

立即掃描  
免費報名

Registration QR code



-  9:00-9:30  
相見歡 享用茶點
-  9:30-10:00  
**Scale Digitally:  
TSMC & IT's  
Transformation**  
林宏達 Chris Lin / 資訊長
-  10:10-11:00  
**TSMC IT Redefined  
& 開箱大解密**  
劉培欣 Patrick Liu / 副處長  
沈文冰 Wenping Shen / 副處長  
胡君怡 Jenny Hu / 部經理  
林世鵬 Shih Peng Lin / 部經理  
沈冠廷 Julian Shen / 技術經理  
謝冬青 Jessica Hsieh / 經理
-  11:30-13:00  
午餐敘
-  13:00-14:00  
**技術對談 (分組議程)**  
資料中心維運自動化  
劉培欣 Patrick Liu / 副處長  
從半導體資料到人工智慧應用  
沈文冰 Wenping Shen / 副處長  
雲原生技術實踐的挑戰  
林世鵬 Shih Peng Lin / 部經理  
從台積電看敏捷帶來的改變  
陳岳澤 Derek Chen / 專案經理
-  14:00-15:00  
下午茶敘





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**THANK YOU  
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