
108年
打造高效能及安全
雲端資料中心

從虛擬化到雲端化的轉型之路

迎棧科技



數位轉型： 從虛擬化到雲端化之路

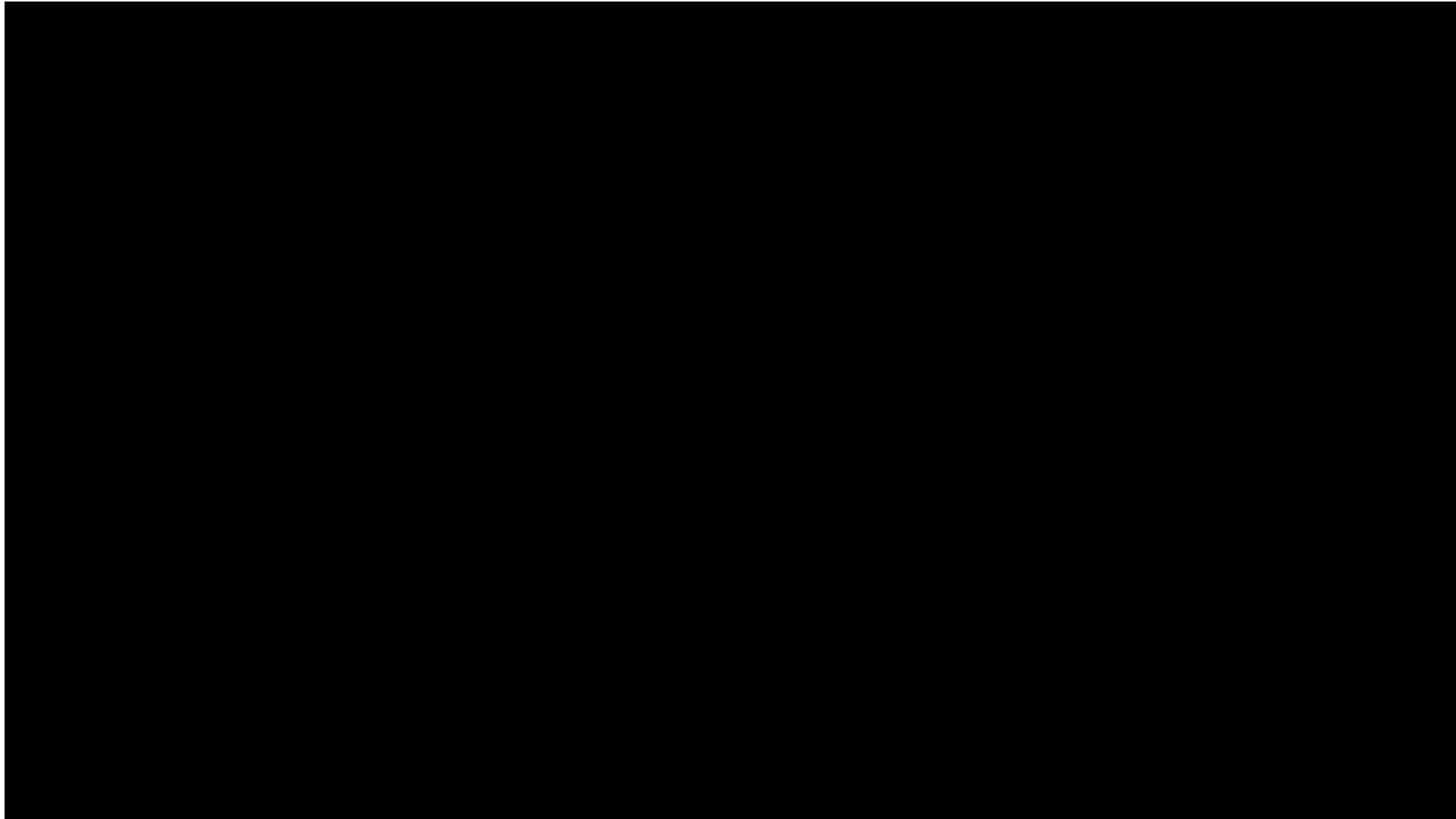
迎棧科技
副總經理

Joseph Wang, 王惠民



Joseph, inwinSTACK的副總經理。
在過去的數年中，專注在創新開源技術之
研究及傳播。

2017, 2018, 2019 OpenStack 基金會董事
2018, 2019 CNCF 基金會代表
2019 Linux 基金會 LF Edge 董事



- 數位趨勢與技術發展
- 外國政府雲端規劃
- 政府數位轉型: 由虛擬化到雲端之路

數位趨勢與技術發展

Digital transformation is so much more complex than software or hardware. It actually changes the way your company operates. You can't just cast a spell on an application and transform it overnight.

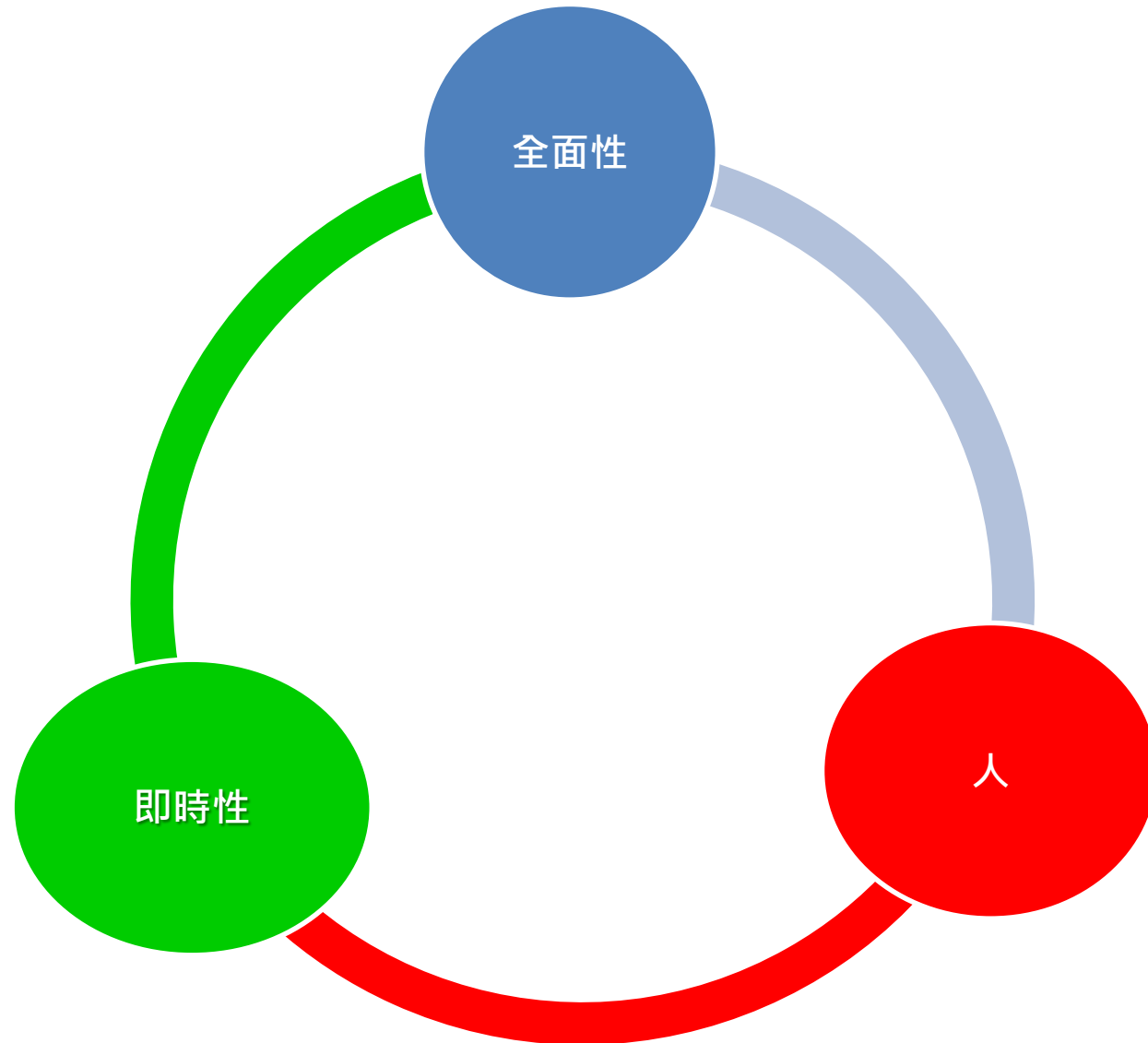
Now, don't get me wrong: Technology plays a big part in helping an organization adapt to change and develop an environment that supports rapid iterations. Cloud-based services can reduce the amount of time you need to think about undifferentiated components of your systems and free your talent to focus on more important endeavors.

Don't Avoid The Need To Transform

Your competition, regardless of the industry, is already finding ways to be more responsive to their customers. I often meet with companies that are embracing new technologies and changing the way they function to create rapid feedback loops and put the right people in the right roles at their organization to achieve that.

Don't avoid the digitization process if you plan to stay in business. It doesn't matter if you're a large enterprise or a small business operating in a very traditional industry. The choice isn't a choice any longer.

數位轉型



≡ Forbes

Digital transformation requires a business to put the right people in the right roles, which is likely different than how most organizations structure their teams today. It's also a process that necessitates input and buy-in from software developers, DevOps, the IT division, executives and essentially every member of an organization.

Consider all the capabilities that your company offers to customers, partners and internal employees. Now, think about the product management discipline that must be sprinkled throughout your company to facilitate a systematic change in how those people interact with each other, the organization and its customers.

To increase the rate of iteration, businesses need the right technology, but they can't be distracted by the latest shiny object that fascinates developers or excitable members of the team.

There is tremendous potential in leveraging cloud-native and open-source technologies, but organizations must also be disciplined about what they build in-house and the tools they should seek from a service provider, cloud provider or vendor. This takes extraordinary discipline because you have to focus time, people and resources on iterating in a way that generates meaningful feedback and contributions from everyone involved.

451 Research

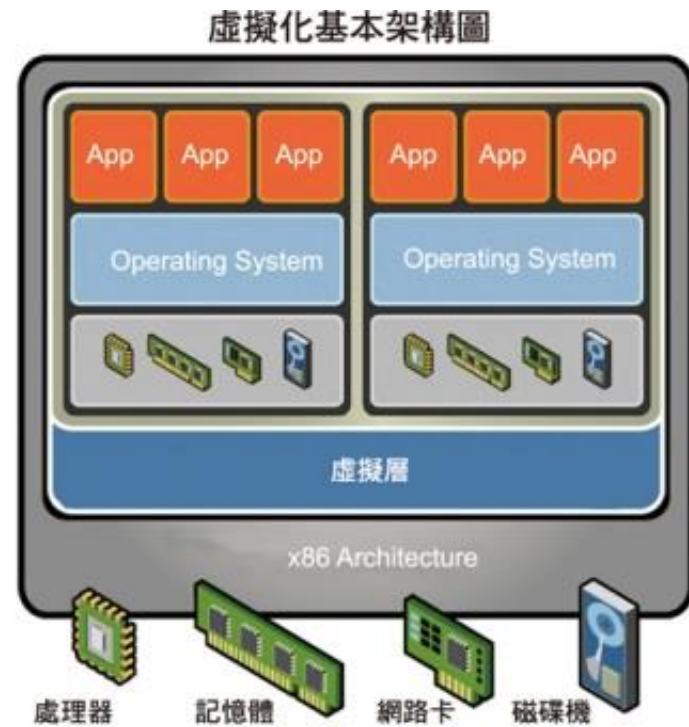
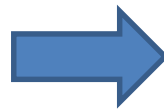


We are in an era of digital revolution, where competitive advantage depends on how well we use the enterprise digital infrastructure, and how we utilize the business applications and massive amounts of data flowing across it. Every company is becoming a software company - some just don't all realize it yet. But those that do are digitally transforming themselves to take advantage of cloud computing at scale, advanced analytics, massive amounts of data coming from every connected device, and the power of AI and machine learning to derive insights from that data and drive better decision-making.

發展史



Windows Server 2003



資料來源：Check Point · DIGITIMES整理 · 2009/9

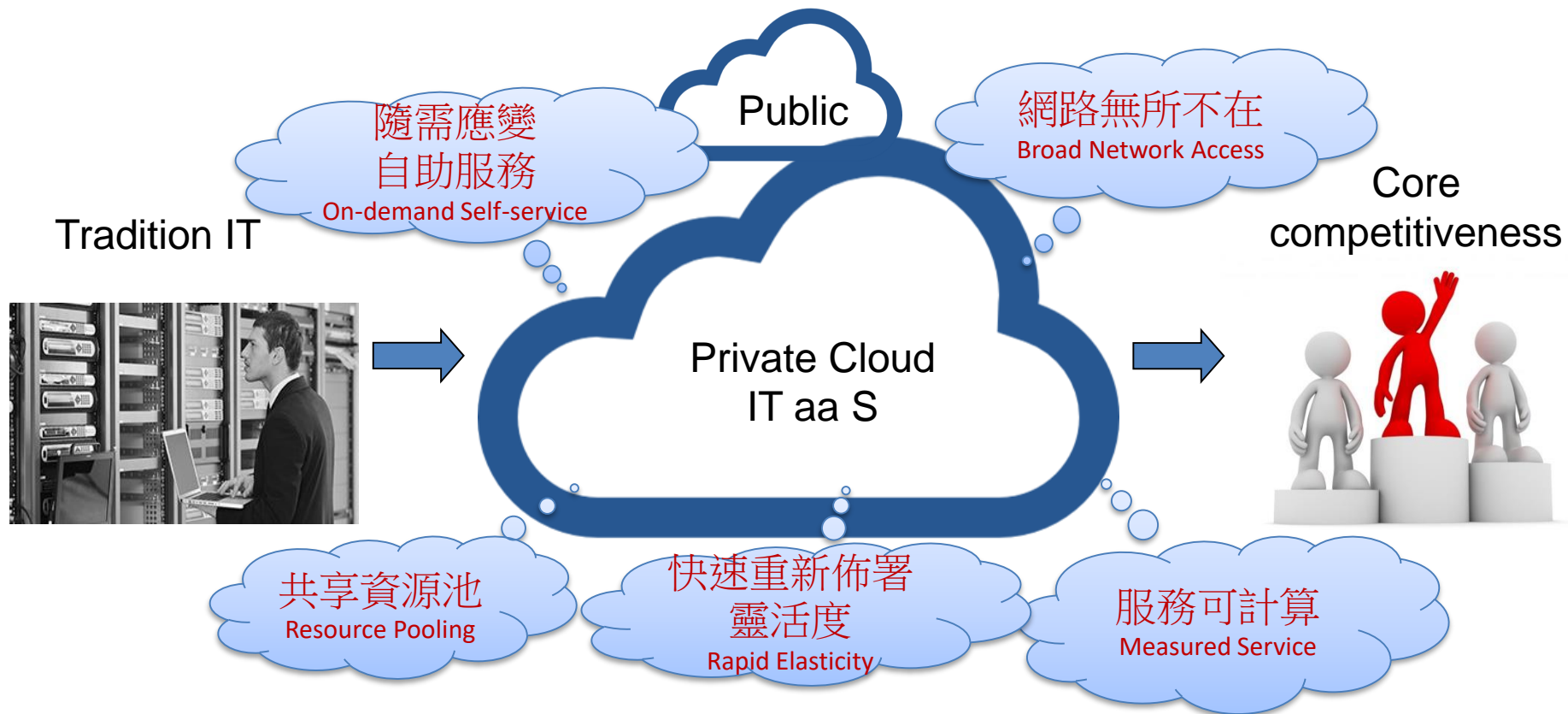
vmware®



雲端運算

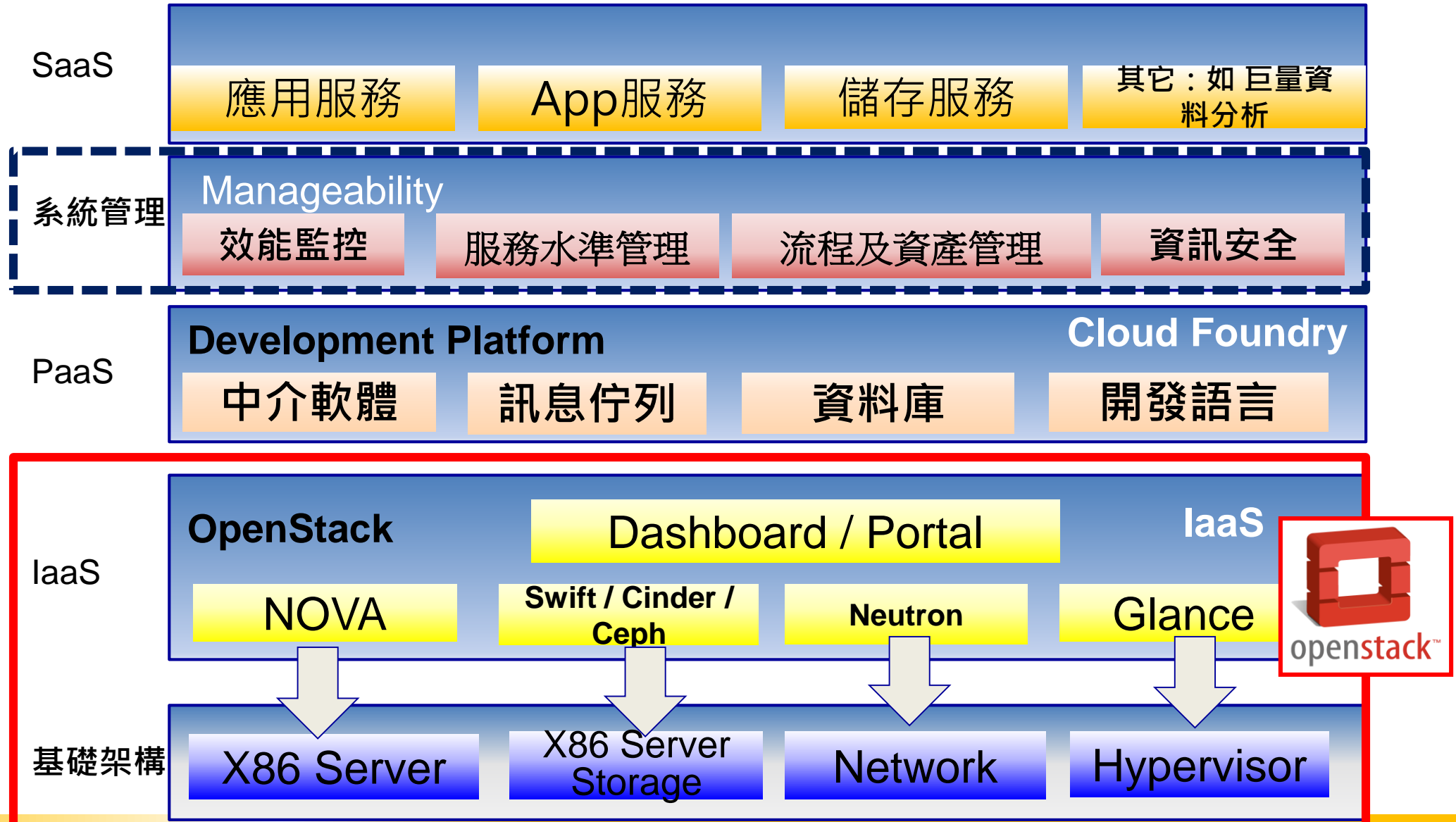


雲端運算: IT Transformation



Scalable and High availability
Computing And Storage Capacity

雲端服務-系統服務架構圖





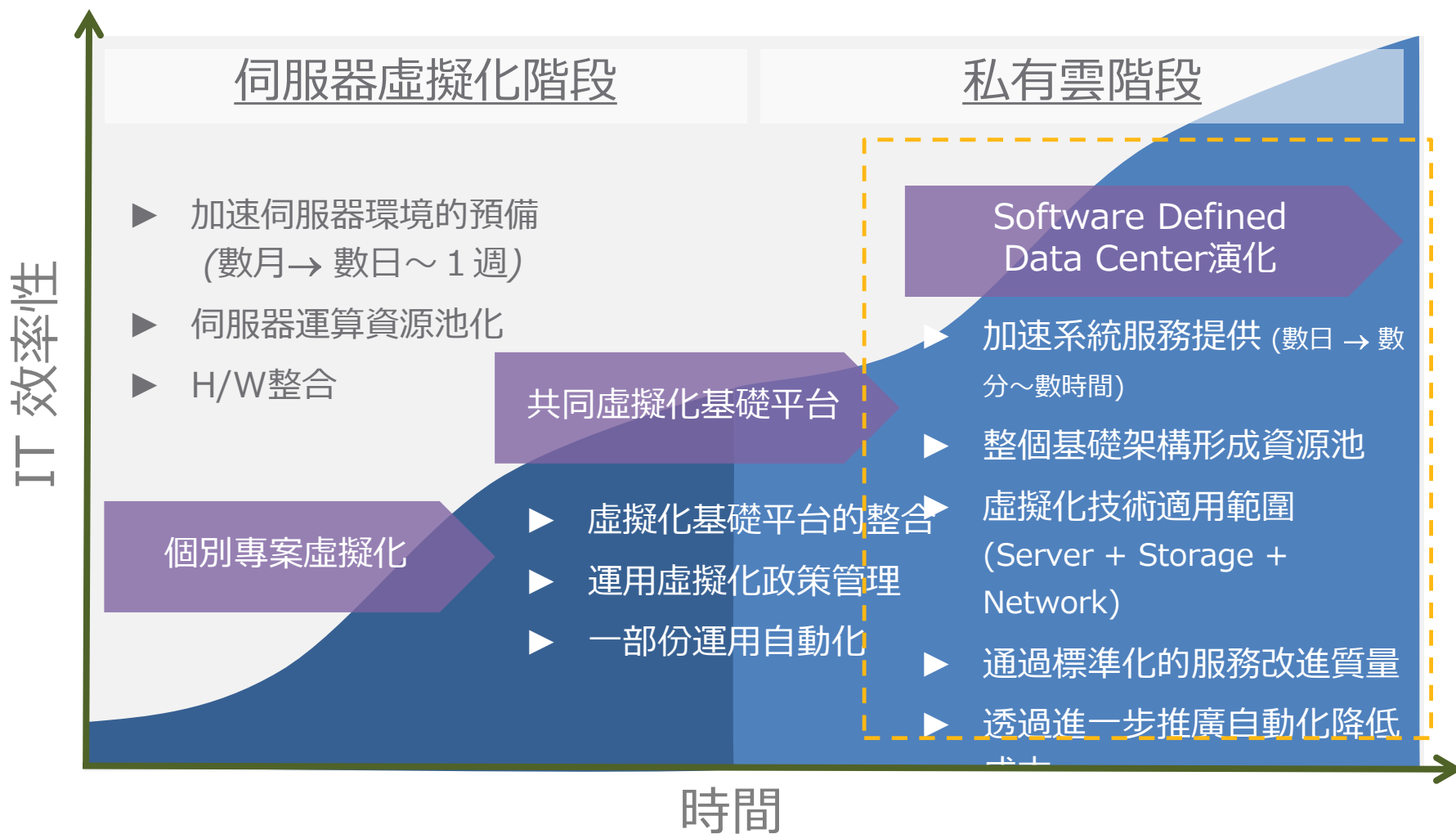
vCenter
vRealize Suite
SDDC
VMC

vmware®

1-1

VMware邁向IT基礎架構高度成熟的模型發展方向

改變從“IT為服務”的角度來提供業務基礎架構



軟體定義資料中心 Software Defined Data Center (SDDC)



Software-Defined Data Center

對資料中心基礎架構進行虛擬化作為IT即服務的資源池，、透過軟體對整體環境提供自動化管理



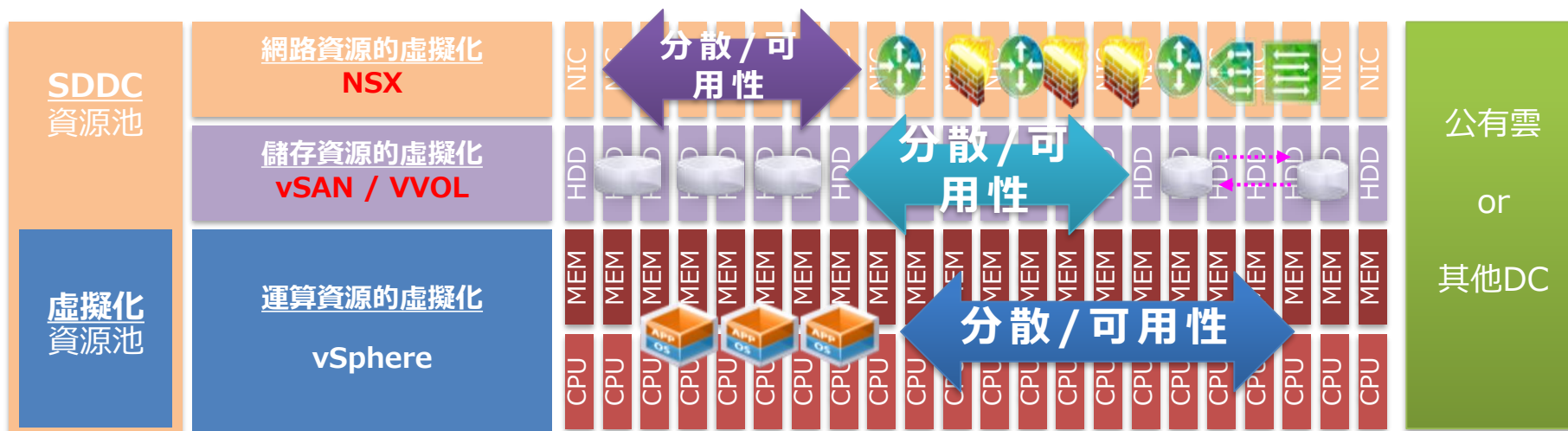
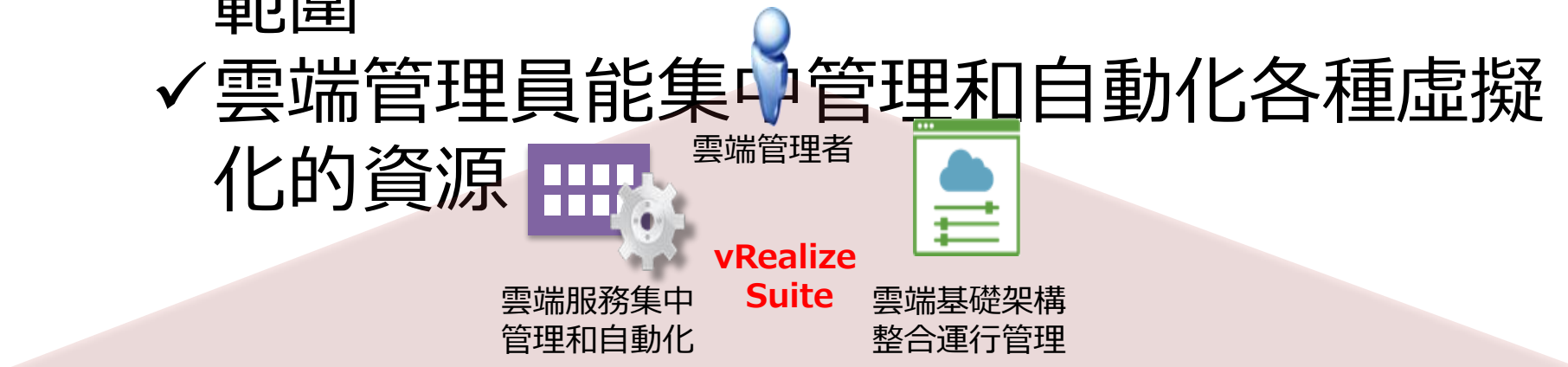
將伺服器的運算資源整合
形成資源池

不依賴於實體網路配置，
提高NW的建立的效率和安
全

基於軟體的分散式
共享儲存資源

SDDC 軟體定義資料中心架構

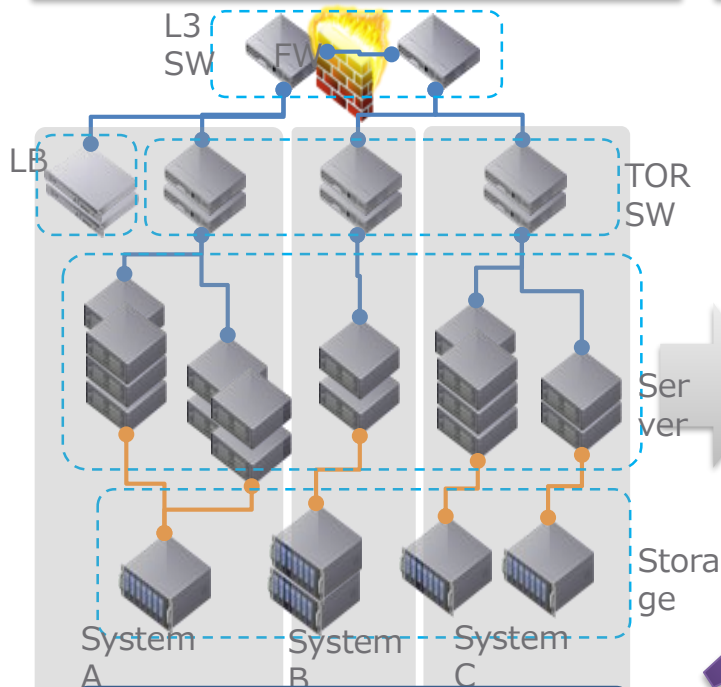
- ✓ 虛擬化從運算資源延展到整個資料中心的範圍
- ✓ 雲端管理員能集中管理和自動化各種虛擬化的資源



雲端運算促成資料中心管理變革

“過去～現在之IT基礎架構”

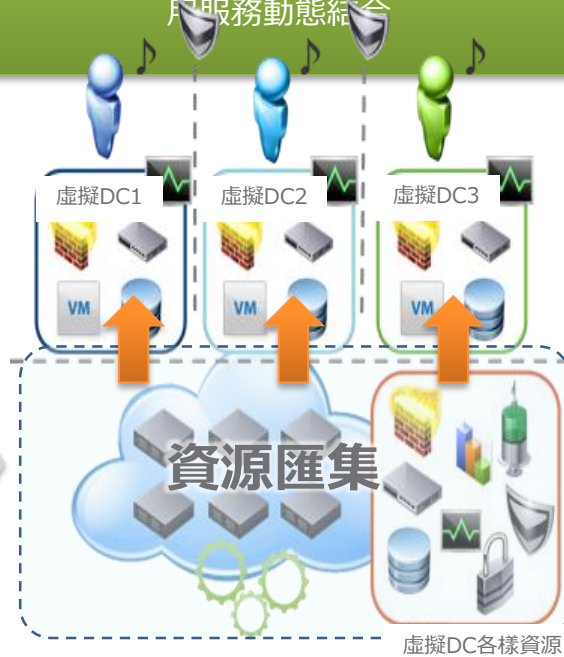
存儲設備、網路相關設備以及x86伺服器等要素



使用率10%以下

“軟體定義資料中心”

控制軟體對整個系統架構進行抽象化,與應用服務動態結合

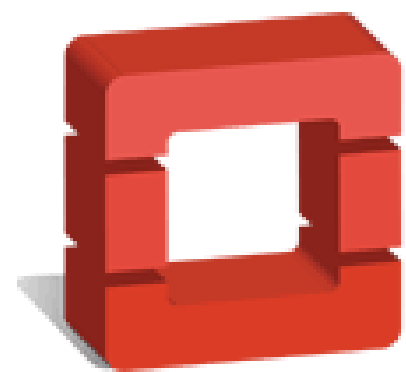


使用率 (~60%) 以上

優化顯著降低總體擁有成本

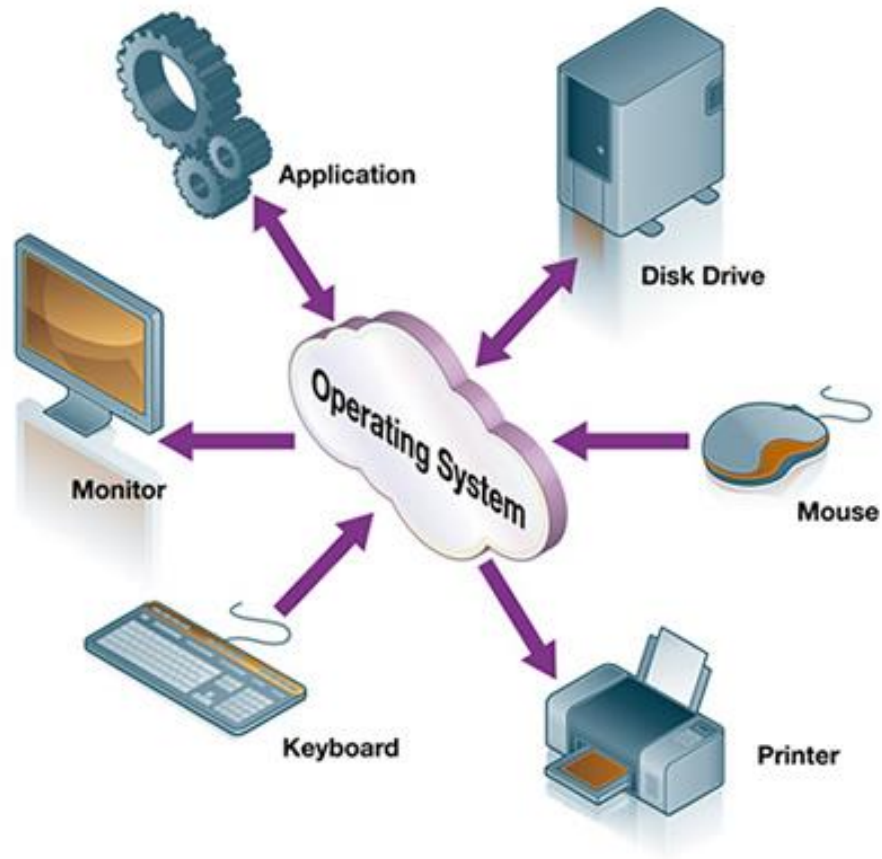
效率提昇 服務水準提昇 私有雲

池化 最佳化 自動化

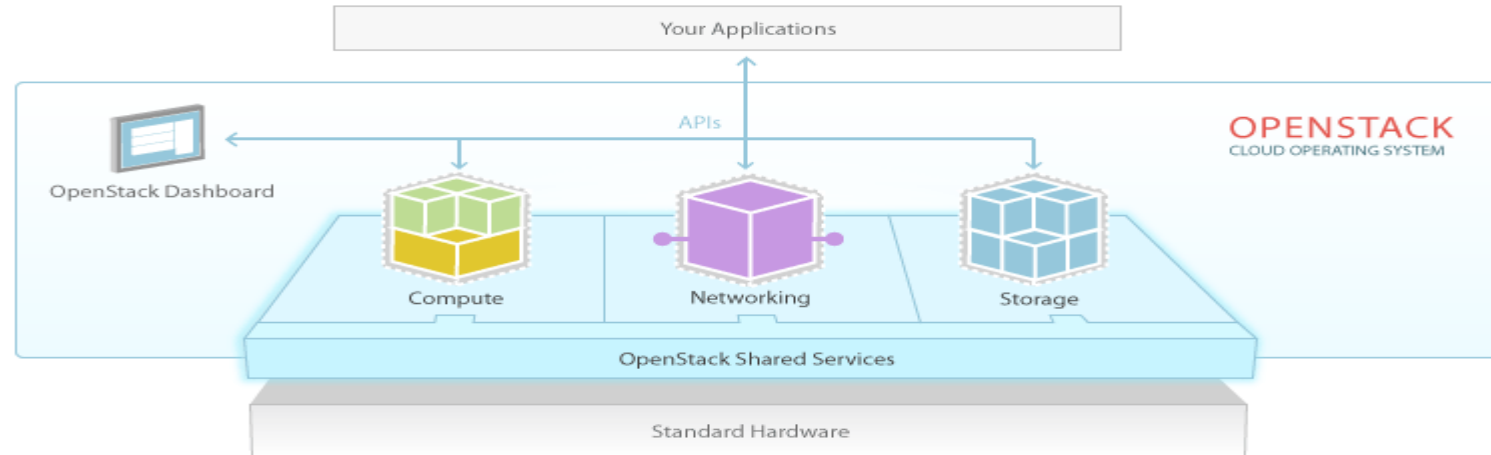


openstack.

OpenStack是雲端作業系統



科技大廠投入開發



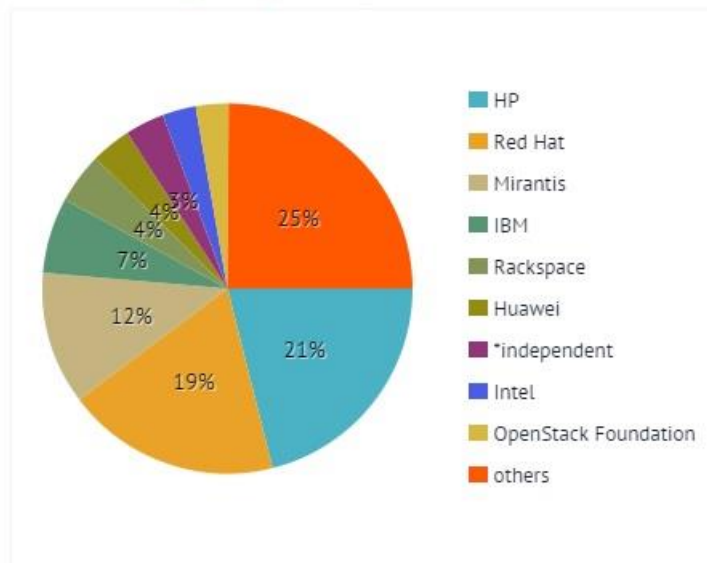

A collection of logos for various technology companies that have invested in OpenStack development, arranged in three columns within rounded rectangular frames:

- Column 1 (Left):** at&t, intel, suse, DELL, NASA, ubuntu, hp, MIRANTIS, vmware, IBM, inwinSTACK, SAP, YAHOO!
- Column 2 (Middle):** AVAYA, ERICSSON, A10 Networks, JUNIPER NETWORKS, CISCO, f5, HUAWEI, NEC
- Column 3 (Right):** EMC², ORACLE, NetApp, HITACHI Inspire the Next

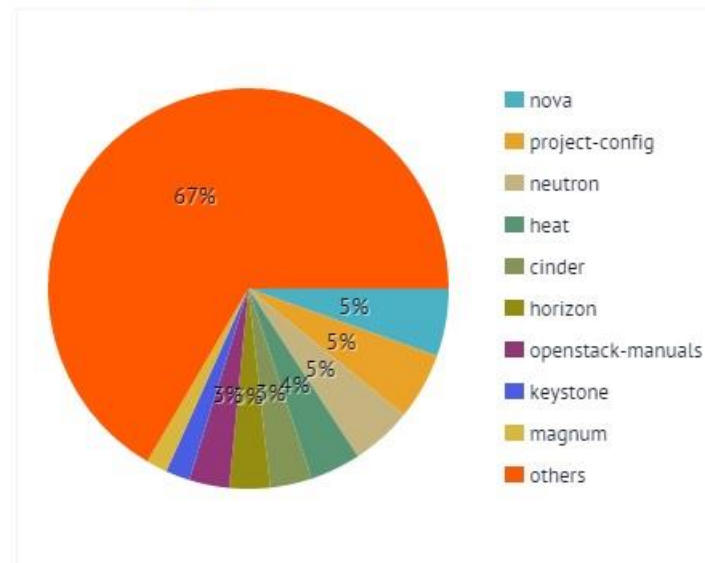
OpenStack community

- 超過850家廠商投入
- 超過20000位研發人員
- 技術快速成長

Contribution by companies



Contribution by modules



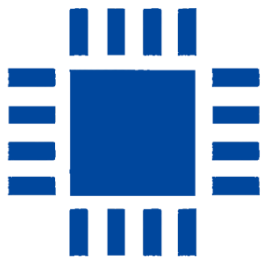
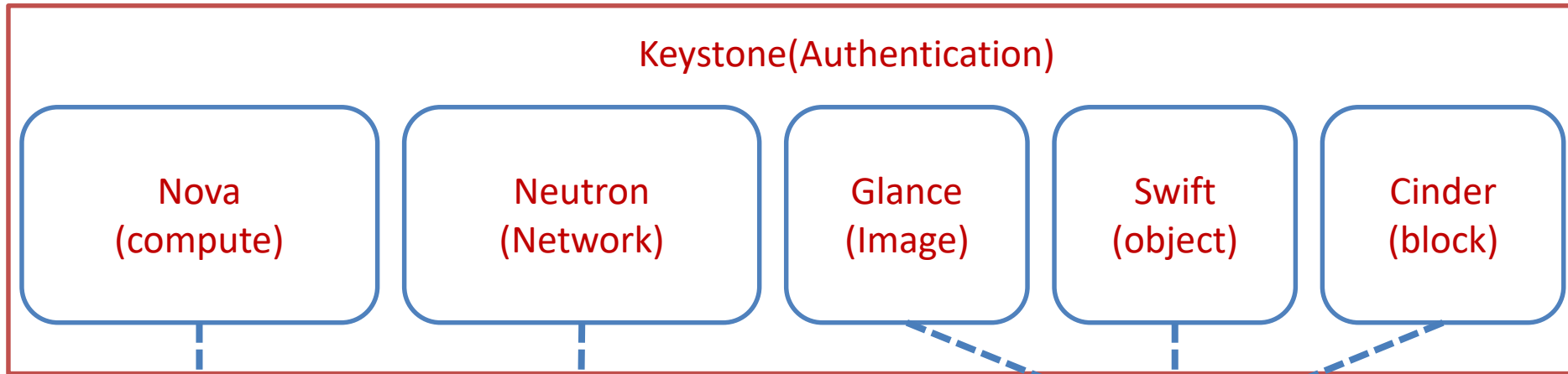
Liberty版(2015)廠商貢獻度

OpenStack成功案例快速成長

- 超過168個國家，超過500個建置...



各大組件



OpenStack的優點

- 彈性(**Flexibility**)
- 降低成本(**cost saving**)
- 靈活性(**Agility**)
- 開放原始碼(**open source**)
- 提升自主競爭力
- 不被廠商綁定(**No vender lock in**)

AI Big Data Cloud Services(TWCC)



服務列表 ▾

大AI測試用計畫-1 (租戶使用者) ▾



首頁

TWCC平台首頁

使用者資訊

使用者 ID : 5e645304-9567-4368-b0dc-522ffb9df7e

使用者帳號 : chungting.k@inwinstack.com

使用者身份 : 租戶使用者

計畫

搜尋



ID ↑	計畫名稱	可用額度	錢包類型
ENT107046	大AI測試用計畫-2	2046834.0151	母錢包
MST107356	大AI測試用計畫-1	1662702.3375	母錢包

1-2 of 2



運算與虛擬雲內容

0

虛擬機器

openstack-taichung-suse

0

大數據叢集

openstack-taichung-suse

0

資料庫

openstack-taichung-suse

0

GPGPU 容器任務

0

HPC 高速運算任務

0

GPGPU 容器服務

網路內容

12

虛擬網路

openstack-taichung-suse

0

網路負載平衡器

openstack-taichung-suse

kibana
5,308 hits
New Save Open Share ◀ ⌚ Last 15 minutes

Uses lucene query syntax 🔍

Discover Add a filter +

Visualize api_gateway_log

Dashboard

Timelion

Dev Tools

Management

Selected Fields

? _source

Available Fields ⚙️

Popular

t _id

t host

t request.body

t request.headers.X-Forwarded-For

t request.headers.host

t request.method

t request.uri

t response.size_bytes

@timestamp

t @version

t _index

_score

t _type

port

t request.headers.accept

t request.headers.accept-encoding

t request.headers.accept-language

t request.headers.access-control-req...

t request.headers.access-control-req...

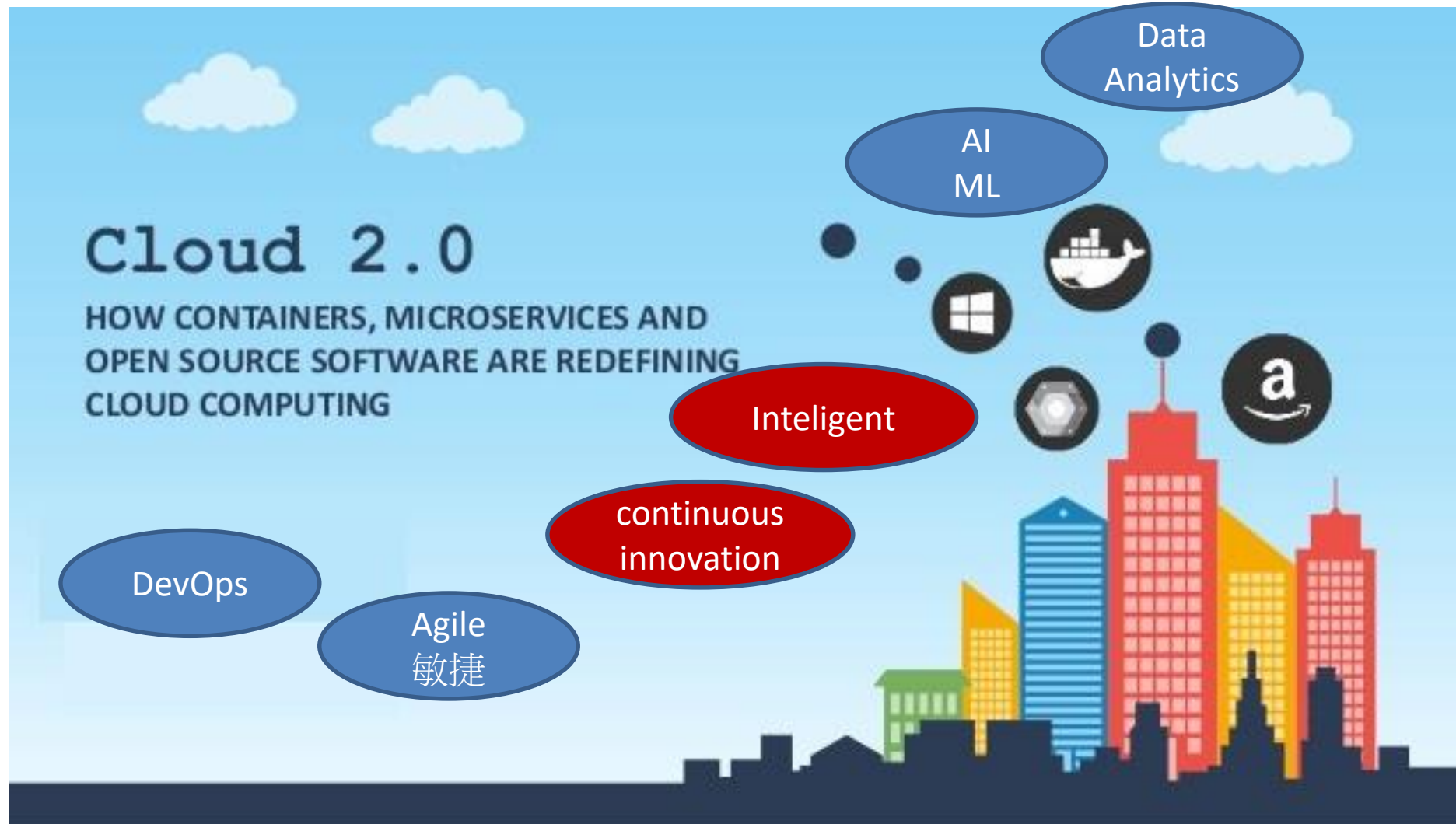
May 13th 2019, 17:32:58.310 - May 13th 2019, 17:47:58.310
Auto ▾

Time ▾

_source

▶ May 13th 2019, 17:47:52.504	<pre>@version: 1 port: 45,410 response.response_time: 0 response.headers.access-control-allow-headers: "x-api-host,x-api-key" response.headers.connection: close response.headers.server: kong/0.13.1 response.headers.access-control-allow-origin: " response.headers.transfer-encoding: chunked response.headers.content-type: text/plain; charset=UTF-8 response.headers.access-control-allow-methods: GET, HEAD, PUT, PATCH, POST, DELETE response.body: response.size_bytes: 5 response.status: 200 response.timestamp: 1,557,740,872.502 request.method: OPTIONS request.headers.user-agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:66.0) Gecko/20100101 Firefox/66.0 request.headers.accept-encoding: gzip, deflate, br request.headers.connection: close request.headers.access-control-request-headers: x-api-host,x-api-key</pre>
▶ May 13th 2019, 17:47:51.773	<pre>host: localhost @version: 1 port: 52,256 response.timestamp: 1,557,740,871.771 response.body: response.response_time: 0 response.status: 200 response.size_bytes: 5 response.headers.server: kong/0.13.1 response.headers.connection: close response.headers.content-type: text/plain; charset=UTF-8 response.headers.access-control-allow-origin: " response.headers.transfer-encoding: chunked response.headers.access-control-allow-methods: GET, HEAD, PUT, PATCH, POST, DELETE response.headers.access-control-allow-headers: "x-api-host,x-api-key request.timestamp: 1,557,740,871.771 request.uri: /api/v2/k8s-taichung-default/sites/ request.url: http://apigateway.twcc.ai:8000/api/v2/k8s-taichung-default/sites/?project=438&sol_categ=container&all_users=1 request.headers.connection: close</pre>
▶ May 13th 2019, 17:47:51.148	<pre>@version: 1 port: 45,406 response.response_time: 1.447 response.headers.x-frame-options: SAMEORIGIN response.headers.connection: close response.headers.via: kong/0.13.1 response.headers.x-kong-upstream-latency: 1447 response.headers.allow: GET, POST, HEAD, OPTIONS response.headers.date: Mon, 13 May 2019 09:47:49 GMT response.headers.x-kong-proxy-latency: 0 response.headers.server: Apache/2.4.7 (Ubuntu) response.headers.access-control-allow-origin: " response.headers.vary: Accept,Accept-Language,Cookie response.headers.transfer-encoding: chunked response.headers.content-type: application/json response.headers.content-language: zh-tw response.body: [{"id":4553,"name":"ENT108037","platform":"k8s-taichung-default"}] response.size_bytes: 77 response.status: 200 response.timestamp: 1,557,740,87</pre>
▶ May 13th 2019, 17:47:51.032	<pre>request.url: http://apigateway.twcc.ai:8000/api/v2/k8s-taichung-default/sites/?project=5533&sol_categ=container request.method: OPTIONS request.timestamp: 1,557,740,871.029 request.uri: /api/v2/k8s-taichung-default/sites/ request.headers.accept-language: en-US,en;q=0.5 request.headers.referer: https://www.twcc.ai/user/containers/list request.headers.x-forwarded-for: 140.109.23.37 request.headers.connection: close request.headers.user-agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:66.0) Gecko/20100101 Firefox/66.0 request.headers.access-control-request-method: GET request.headers.host: apigateway.twcc.ai request.headers.accept-encoding: gzip, deflate, br request.headers.X-Forwarded-For: 140.109.23.37 request.headers.access-control-request-headers: x-api-host,x-api-key</pre>

Cloud 2.0



VMware的願景 “從ONE Cloud 到 ANY Cloud 的進化”

ANY DEVICE



WORKSPACE ONE

桌面

行動

ID管理



ANY APPLICATION



傳統的應用

雲端原生應用

SaaS應用



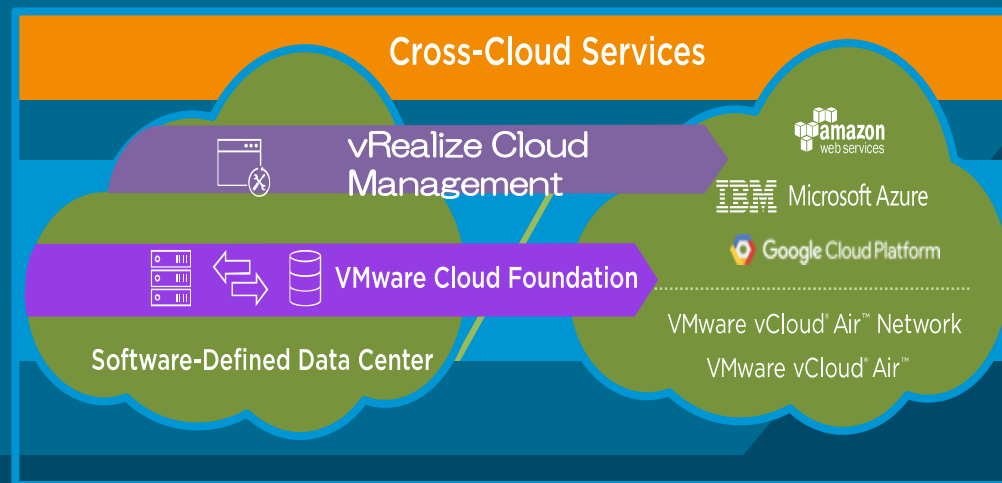
VMware CROSS-CLOUD ARCHITECTURE™

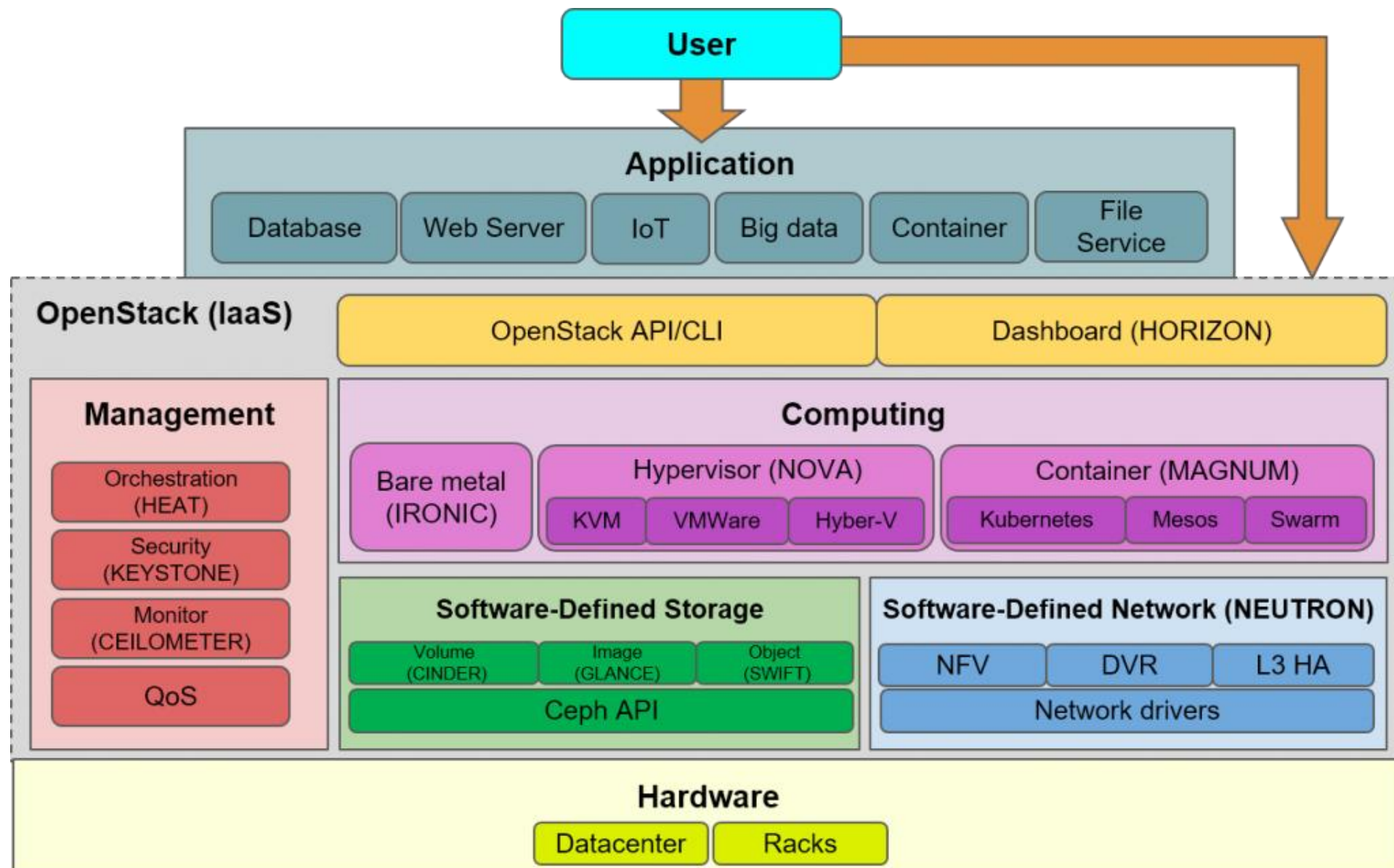
私有雲

混合雲

公有雲

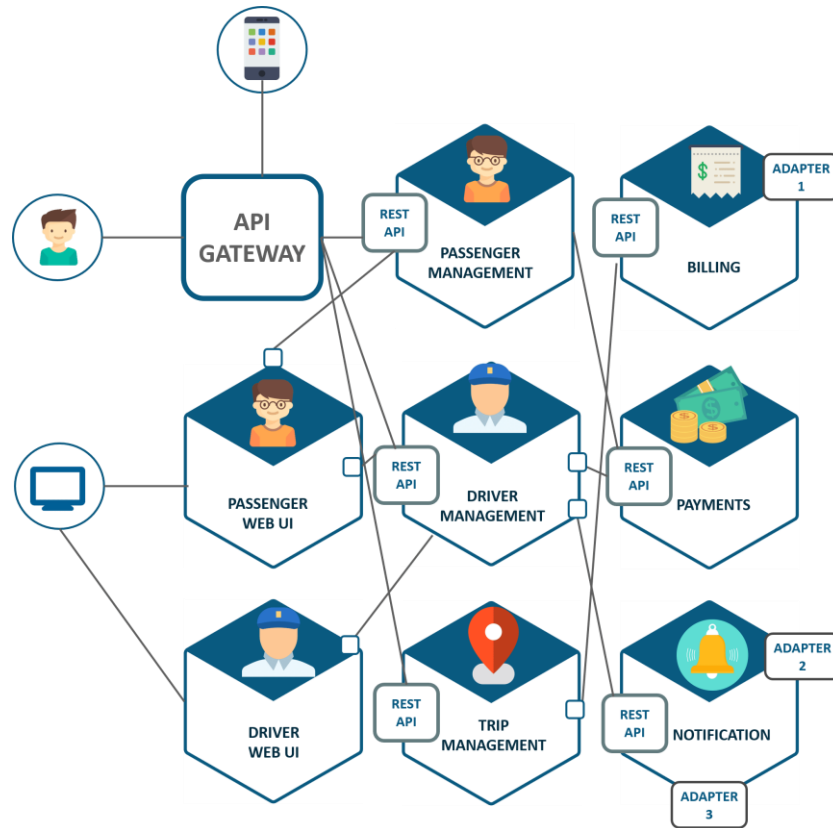
ANY CLOUD





微服物

微服務 (Microservices) 是一種軟體架構風格，它是以專注於單一責任與功能的小型功能區段 (Small Building Blocks) 為基礎，利用模組化的方式組合出複雜的大型應用程式，各功能區段使用與語言無關 (Language-Independent/Language agnostic) 的 API 集相互通訊。



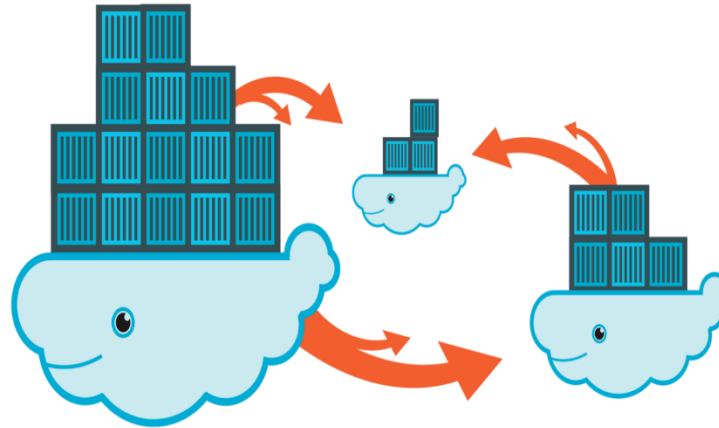
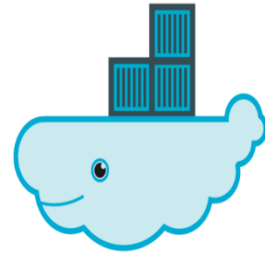
What is Docker?

Docker is the world's leading software container platform.

Who uses Docker?

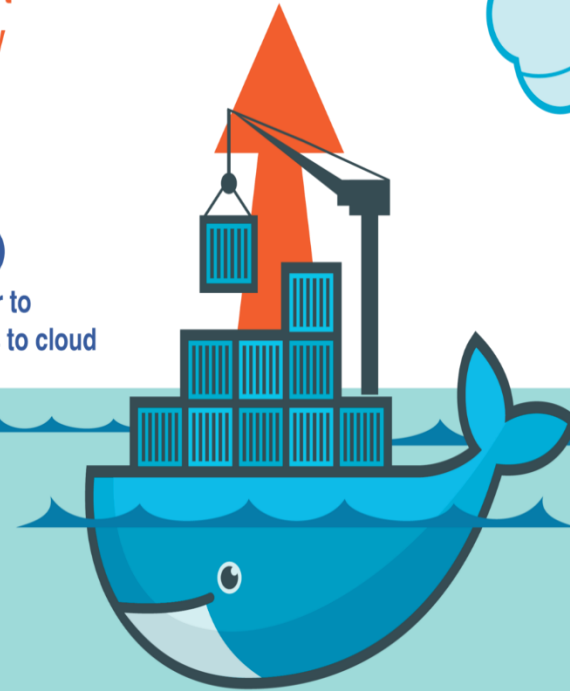
80%

say Docker is part
of cloud strategy



60%

plan to use Docker to
migrate workloads to cloud



41%

want application
portability across
environments

35+%

want to avoid
cloud vendor
lock-in



Who uses Docker?


- Modernize Traditional Apps
- Continuous Integration and Deployment
- Microservices
- IT Infrastructure Optimization




Who uses Docker?



App Development Changes

- 
- Huge Applications
 - Hours to Build
 - Huge Downtime

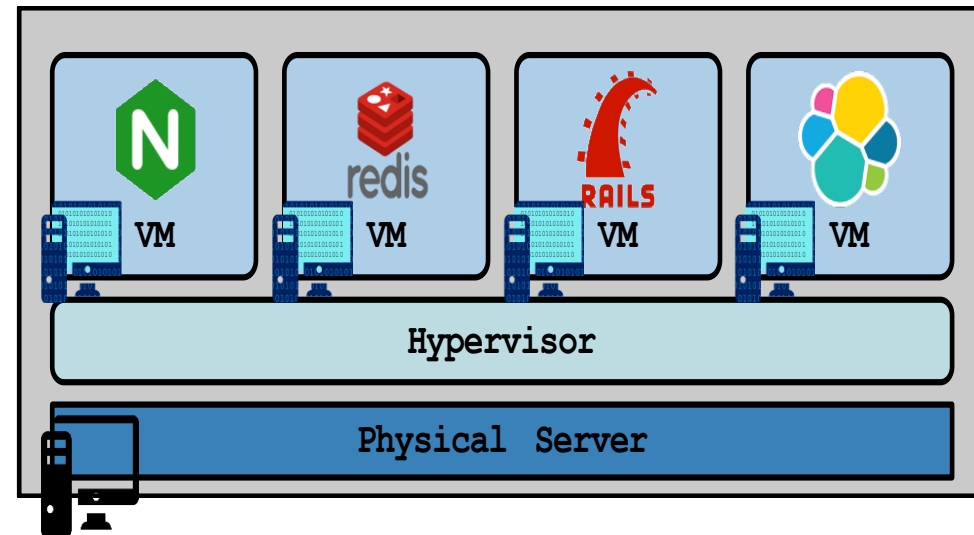
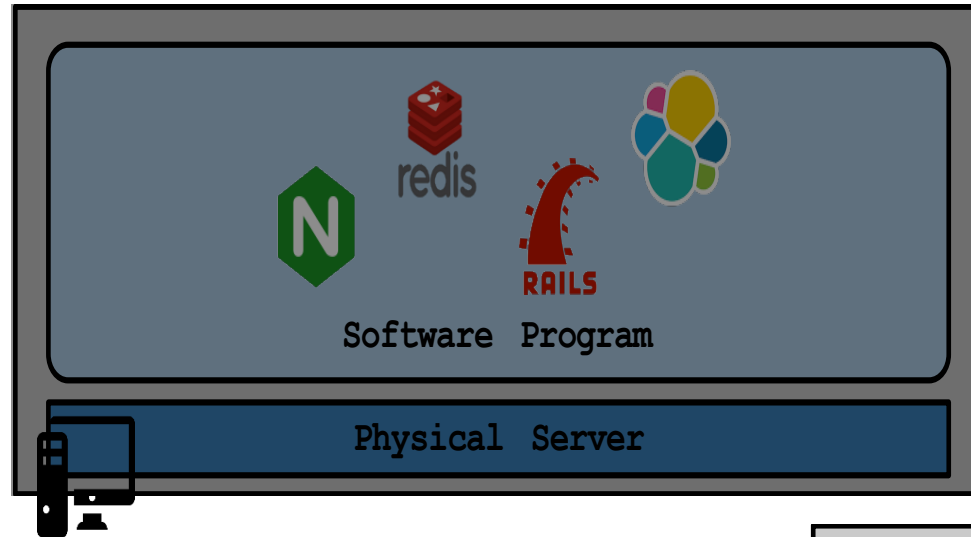


- 
- Microservices
 - Container Deployment
 - Independent Deployments
 - Fast Version Releases

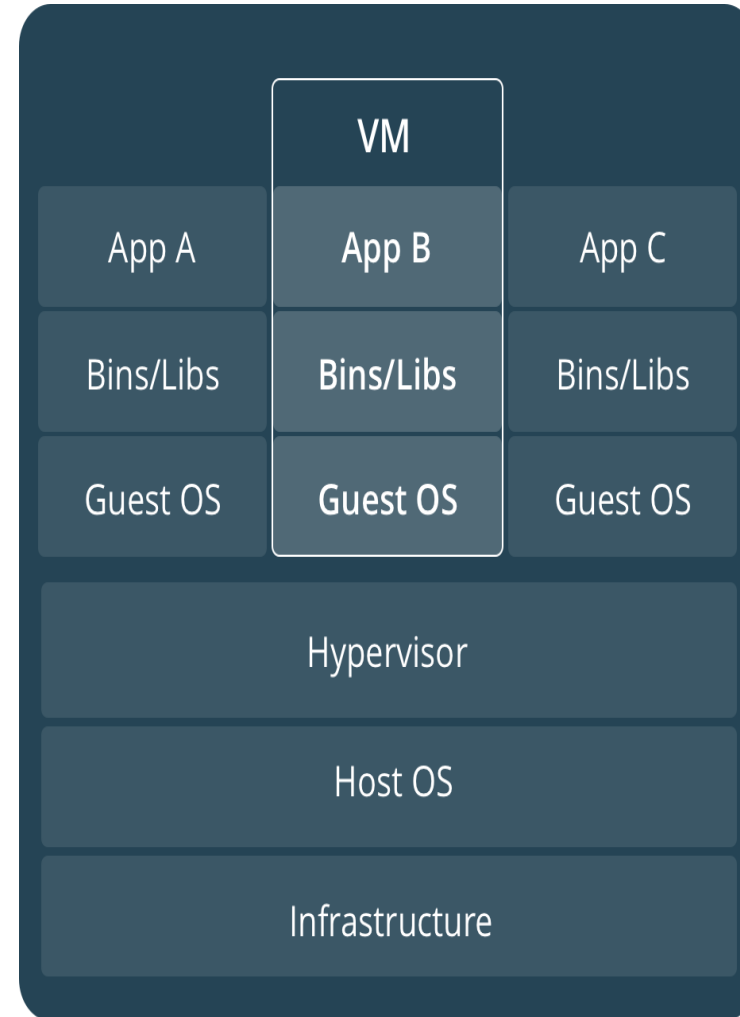
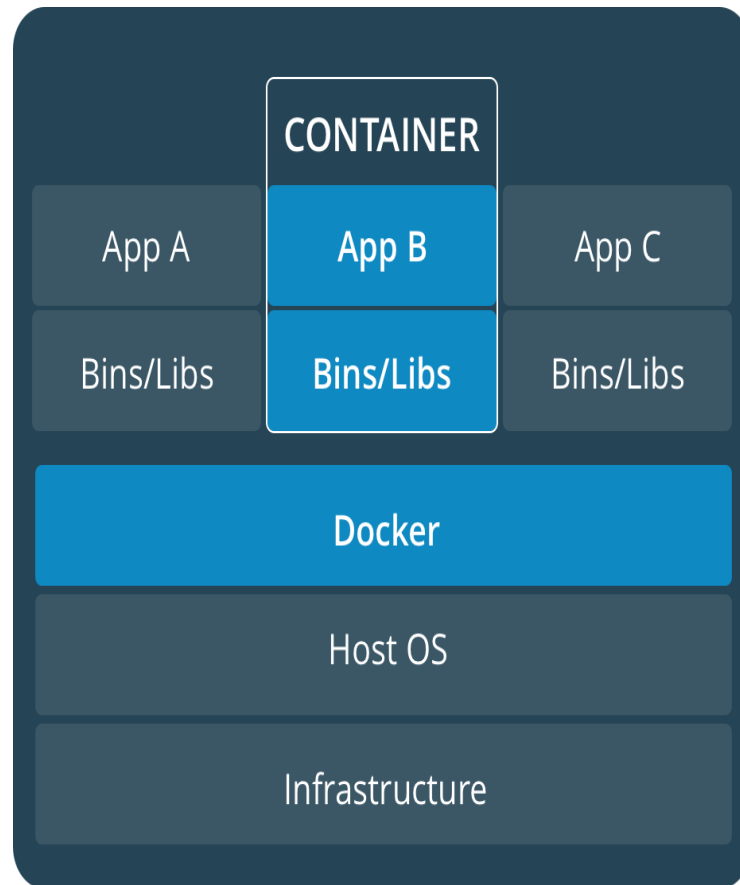
What is Microservices?



What is Microservices?

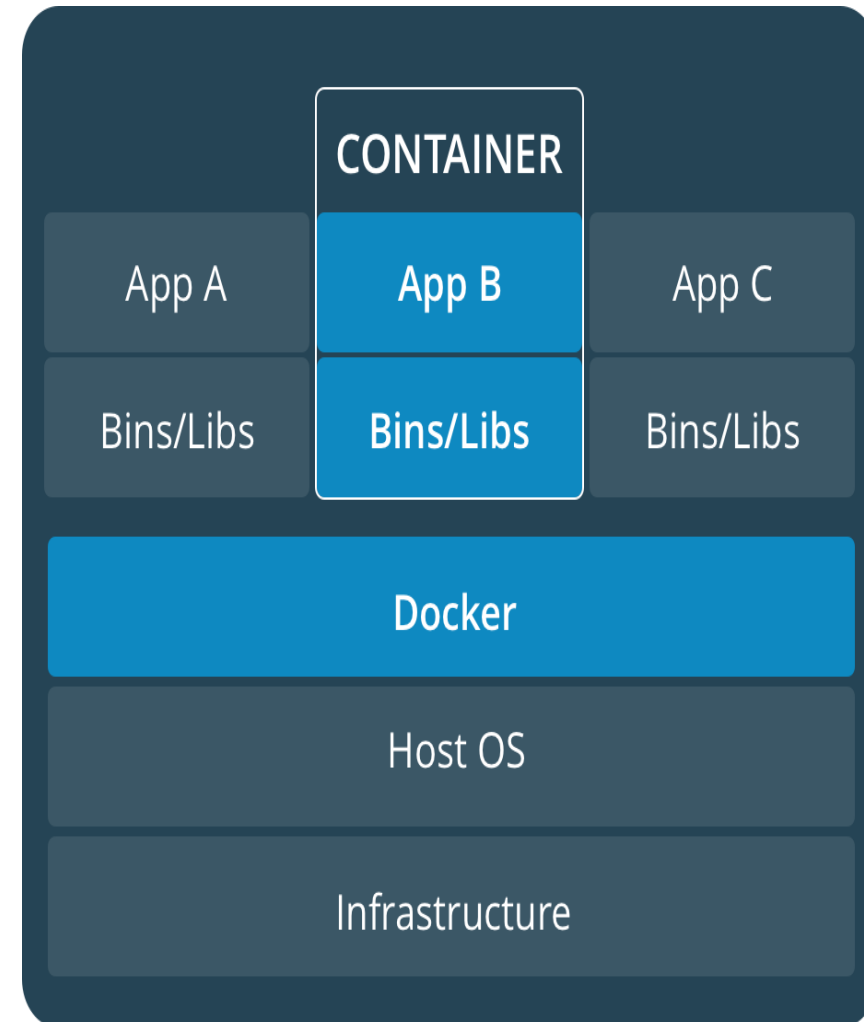


What is Microservices?

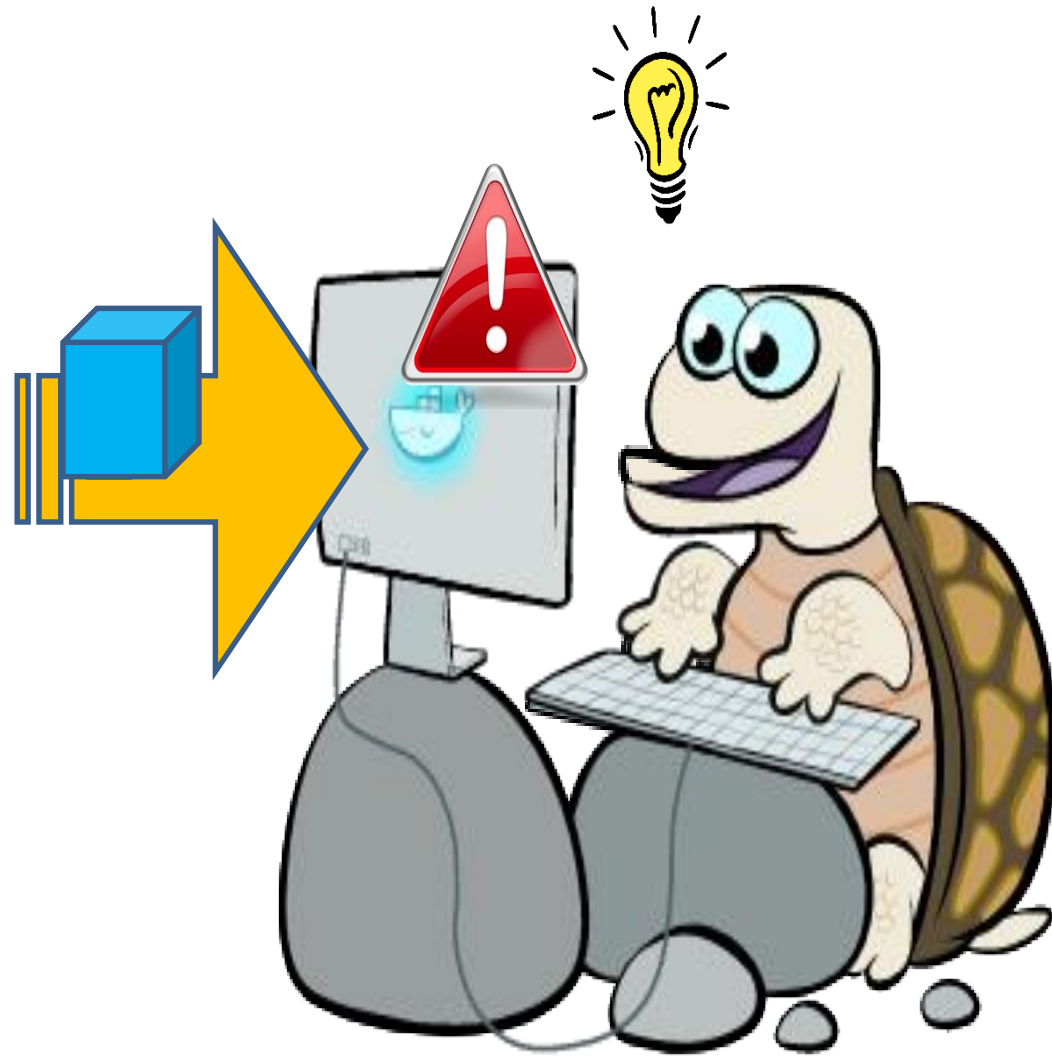
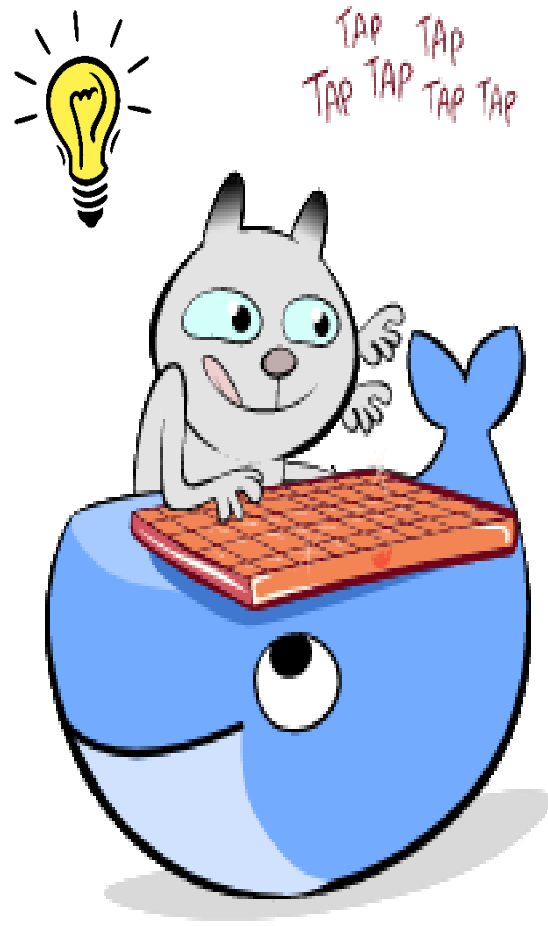


Containers

- Light-weighted
- Isolated Apps
- Version Control
- Fast Delivery
- Portability

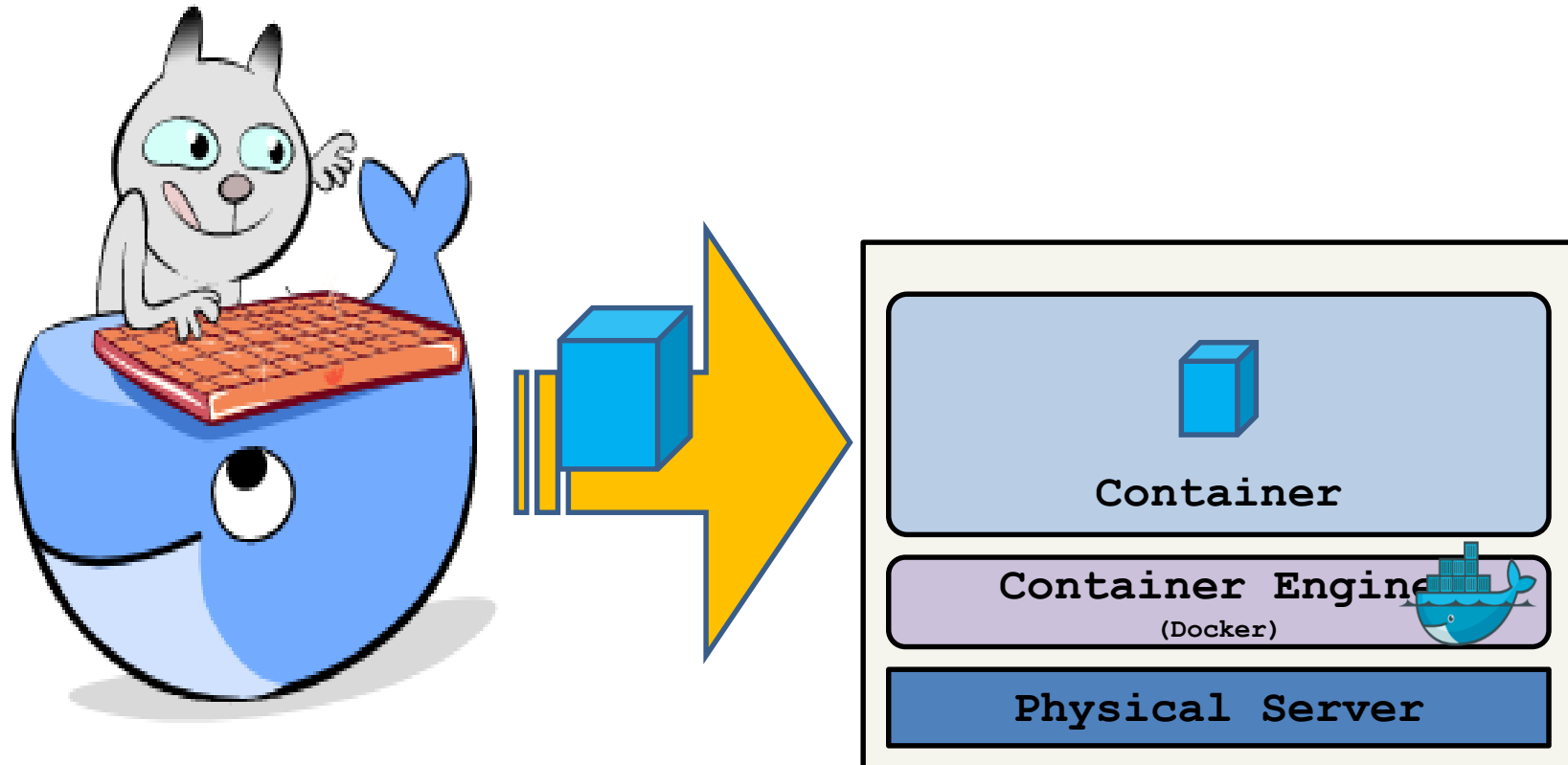


Containers



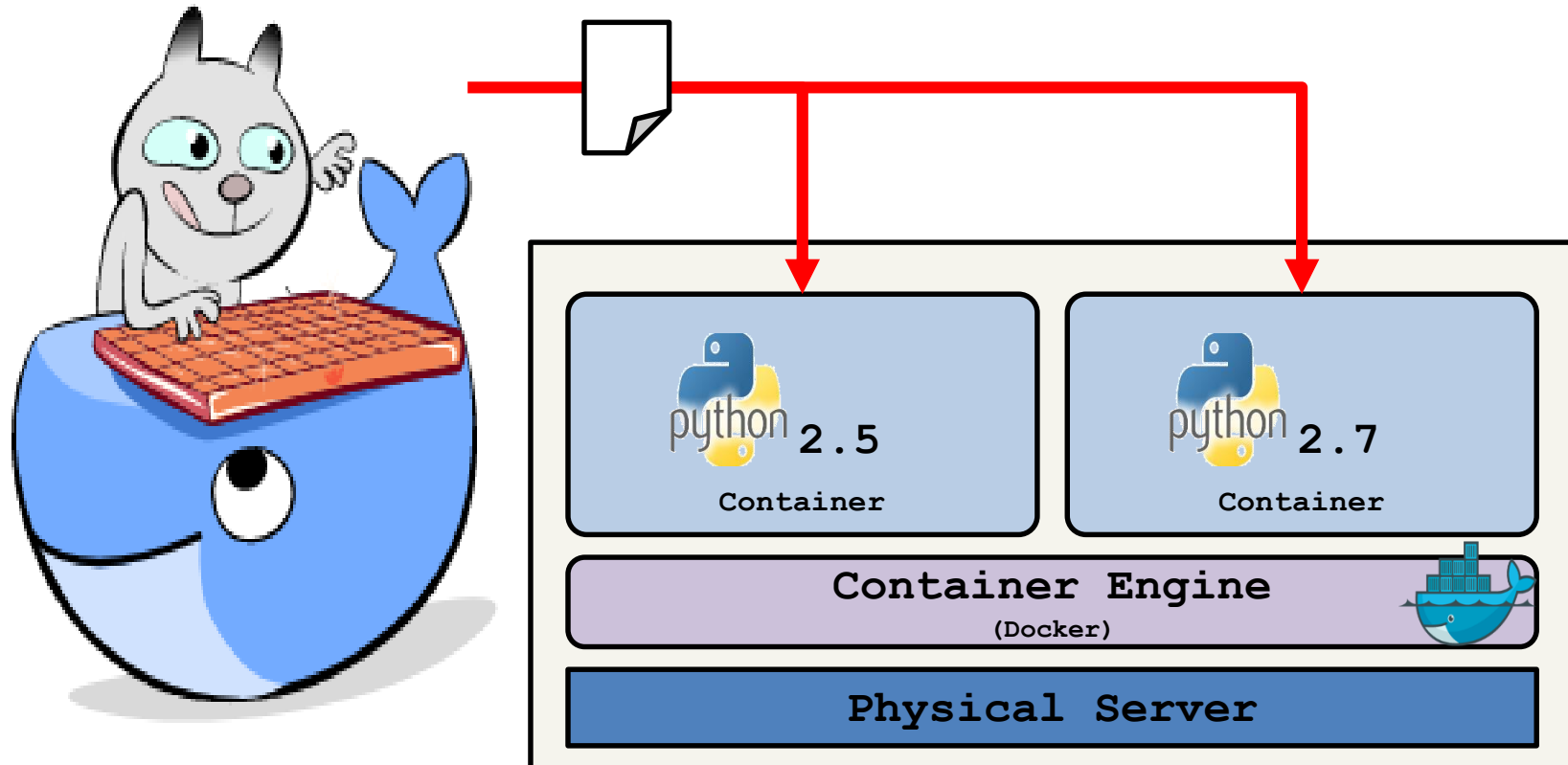
Containers

- Local Development



Containers

- Simplified Testing



We've learned what it can do

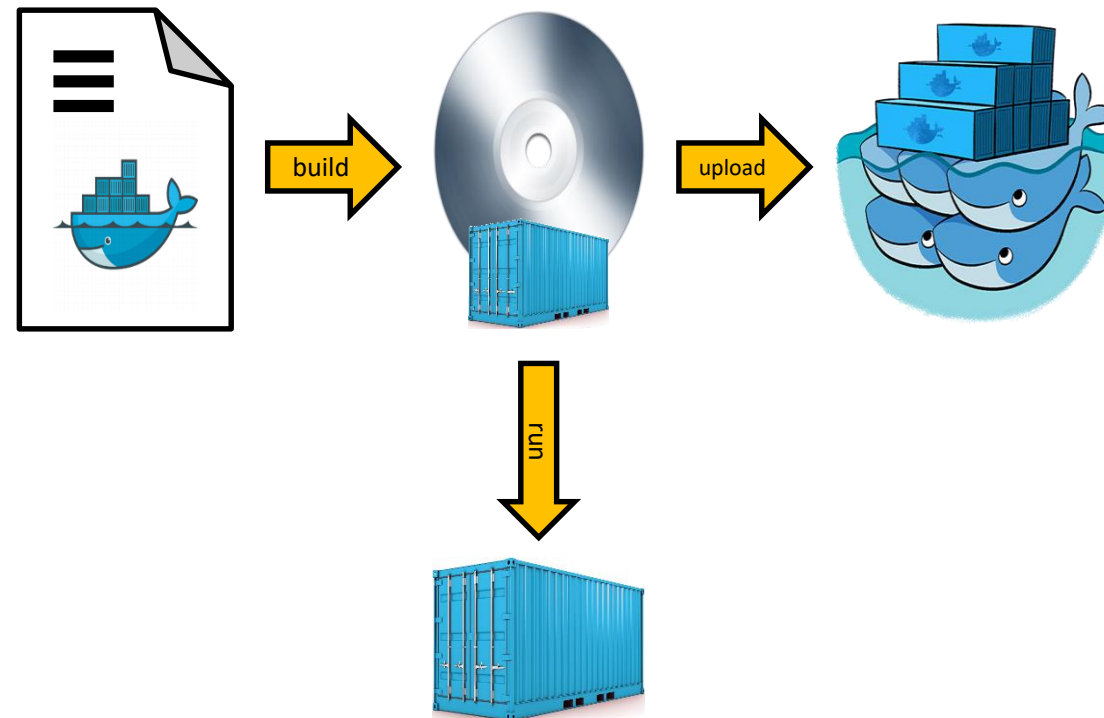
but...

What is Docker, actually?

Docker 101

Docker provides a uniformed wrapper around a software package

- Containers
- Images
- Dockerfile
- Docker Hub



Docker 101

Docker provides a uniformed wrapper around a software package

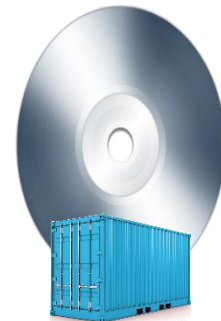
- Containers:
 1. Includes the running application
 2. Contains everything needed to run App
 3. Isolated App platform
 4. Based on one or more **images**



Docker 101

Docker provides a uniformed wrapper around a software package

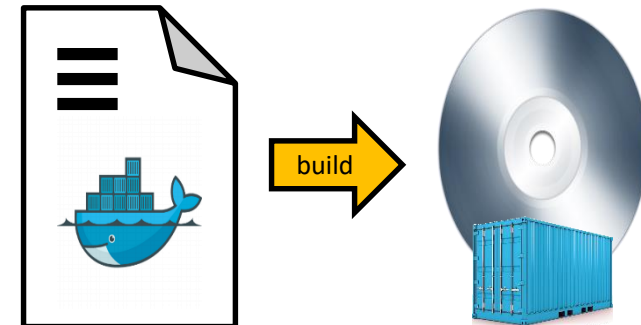
- Images:
 1. Read-only template to create containers
 2. Built by `Dockerfile`
 3. Stored in `Docker Hub`



Docker 101

Docker provides a uniformed wrapper around a software package

- Dockerfile:
 1. Instructions for Docker to build images
 2. Text document
 3. Calls command line

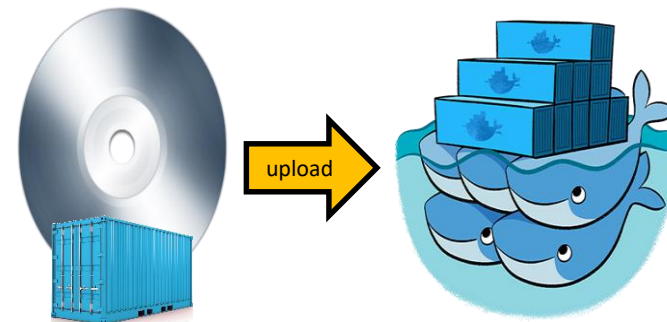


Docker 101

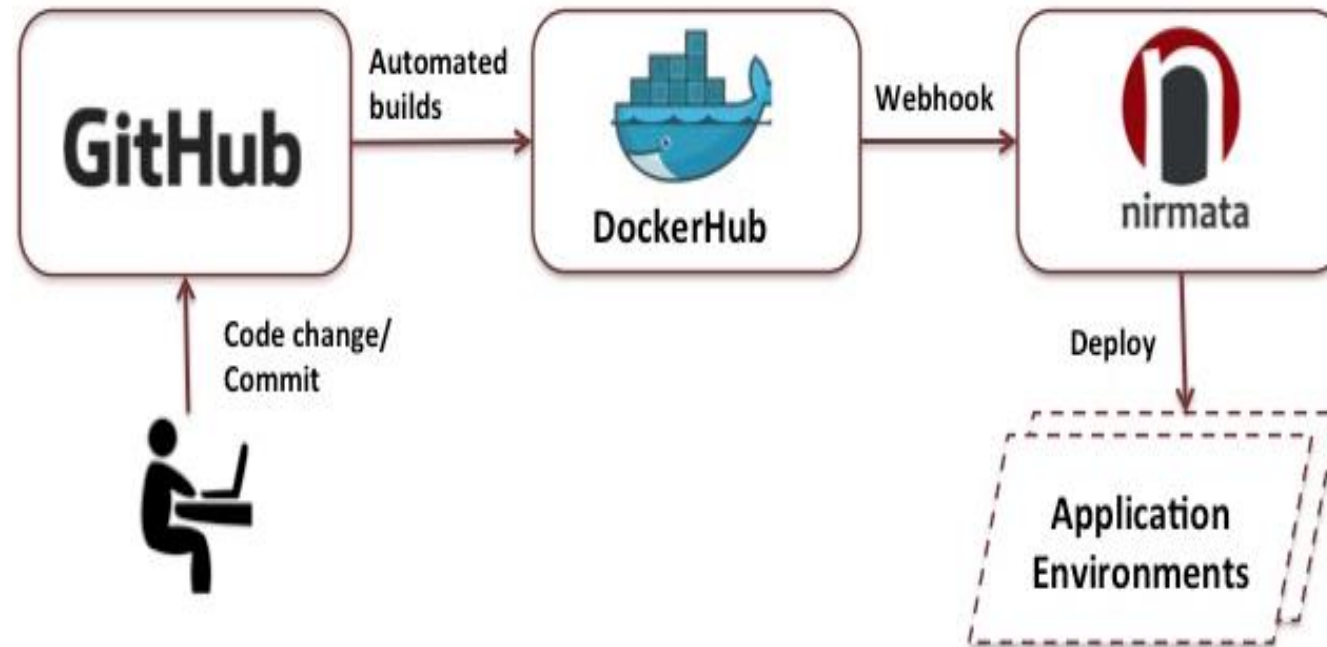
Docker provides a uniformed wrapper around a software package

- Docker Hub
 1. Image Repositories
 2. Automated Builds
 3. Webhooks
 4. Organizations

(it's kinda like gitHub)



Docker Hub



What is Kubernetes?

A powerful container orchestrator open sourced by Google Inc.

Introduction

- Κυβερνήτης: Governor, Pilot.
- “K8S”
- Current Release: 1.14+
- <https://kubernetes.io/>
- Release Roadmap
<https://github.com/kubernetes/kubernetes/milestones/>



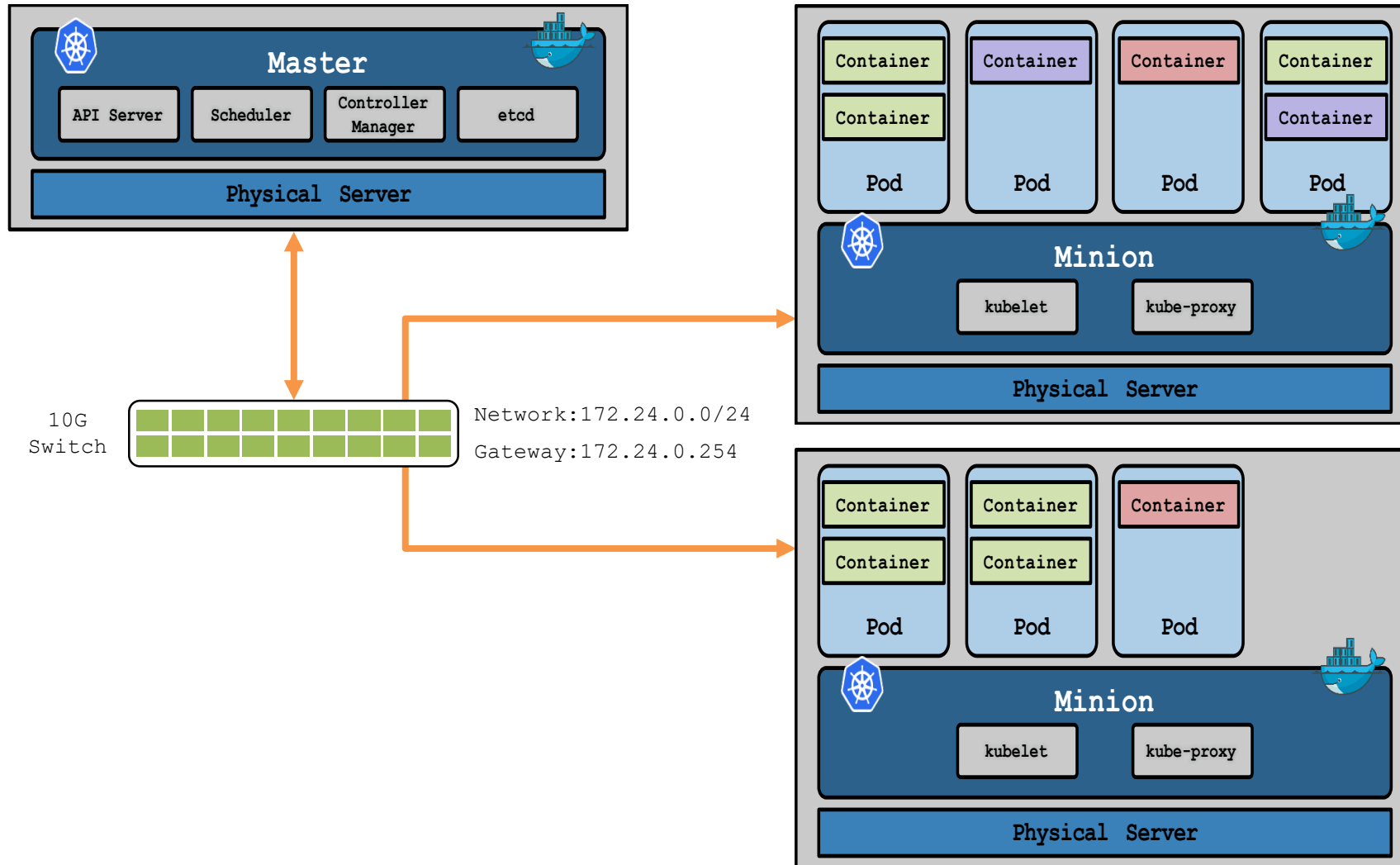
Introduction

- Easy to use
- Auto load balance
- Simple migration
- Yaml based tasks
- Orchestration
- Public, private, hybrid clouds

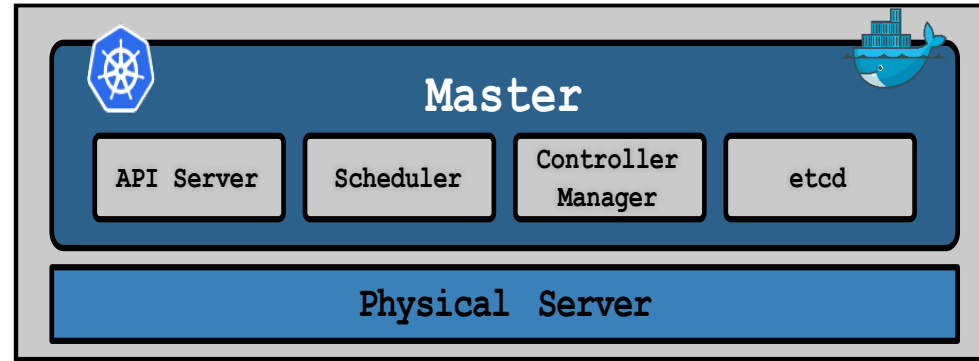


kubernetes

Kubernetes Cluster



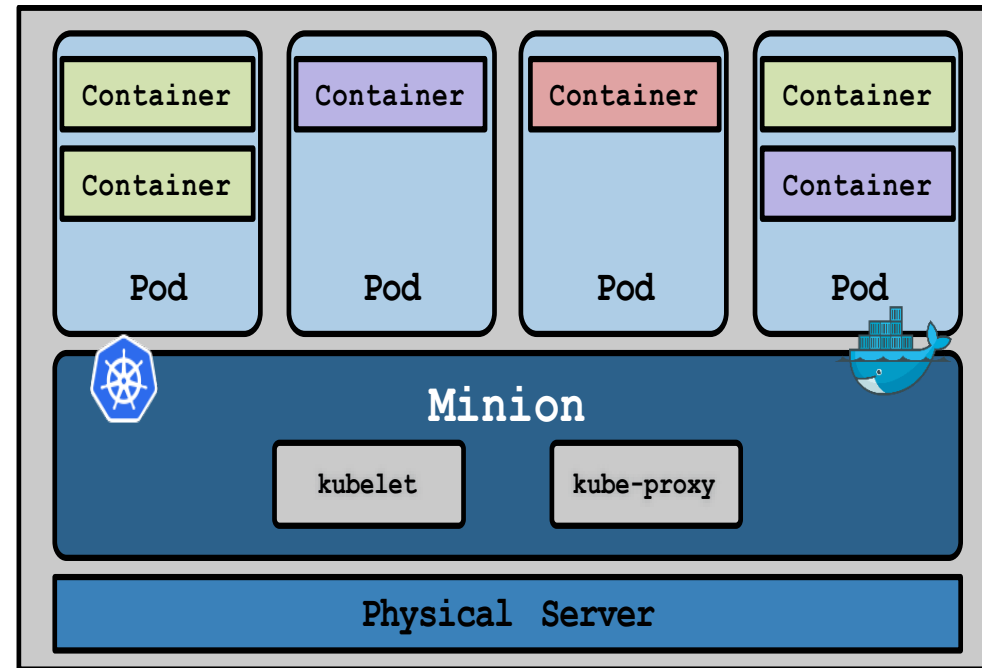
Master Node



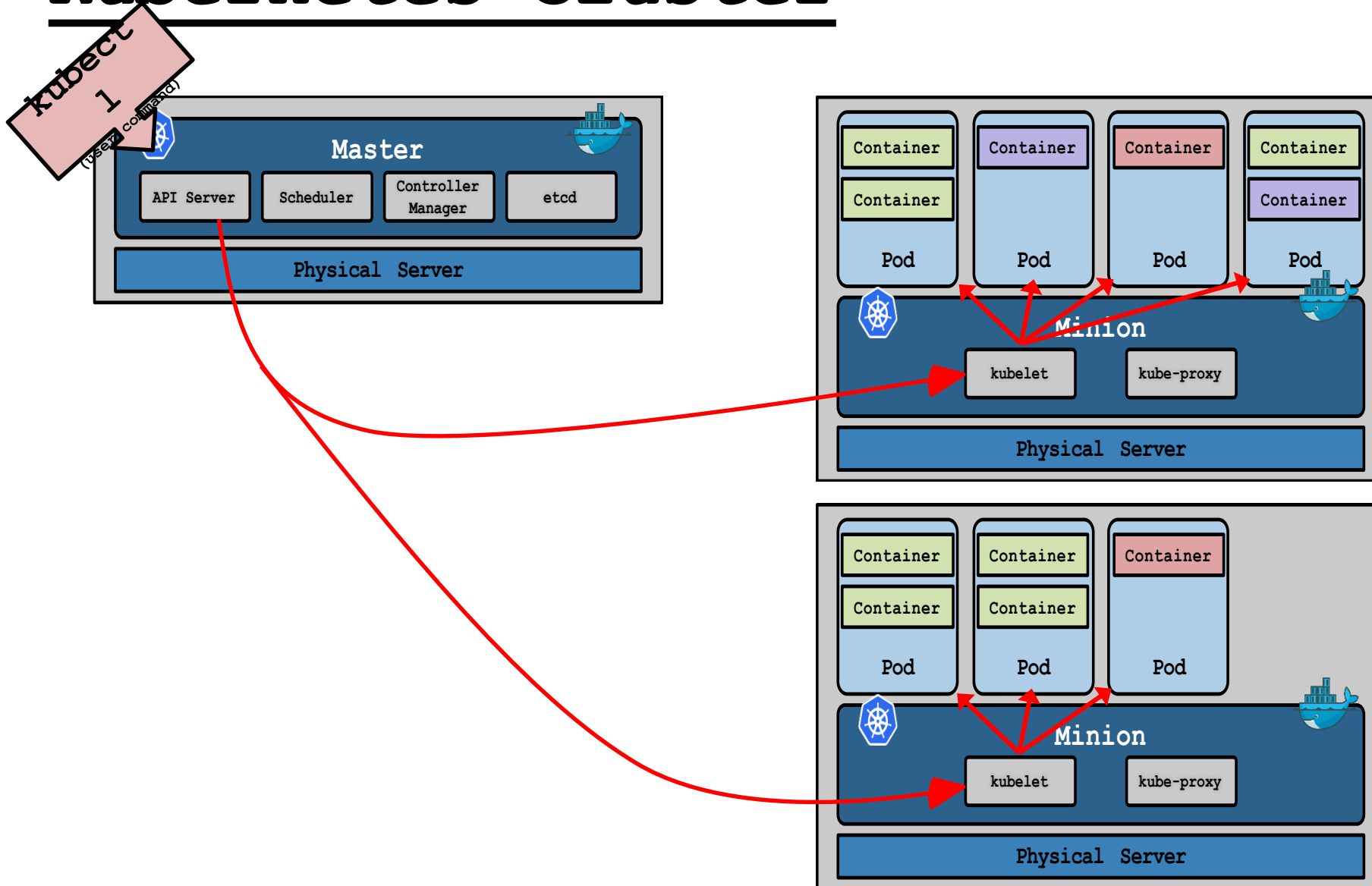
- **API Server**
Validates & configures data for the API objects
- **Scheduler**
Schedule & manage resources of the distributed cluster
- **Controller Manager**
A daemon that embeds the core control loops
- **Etcd**
A key value store which Kubernetes uses for persistent storage

Minion Node

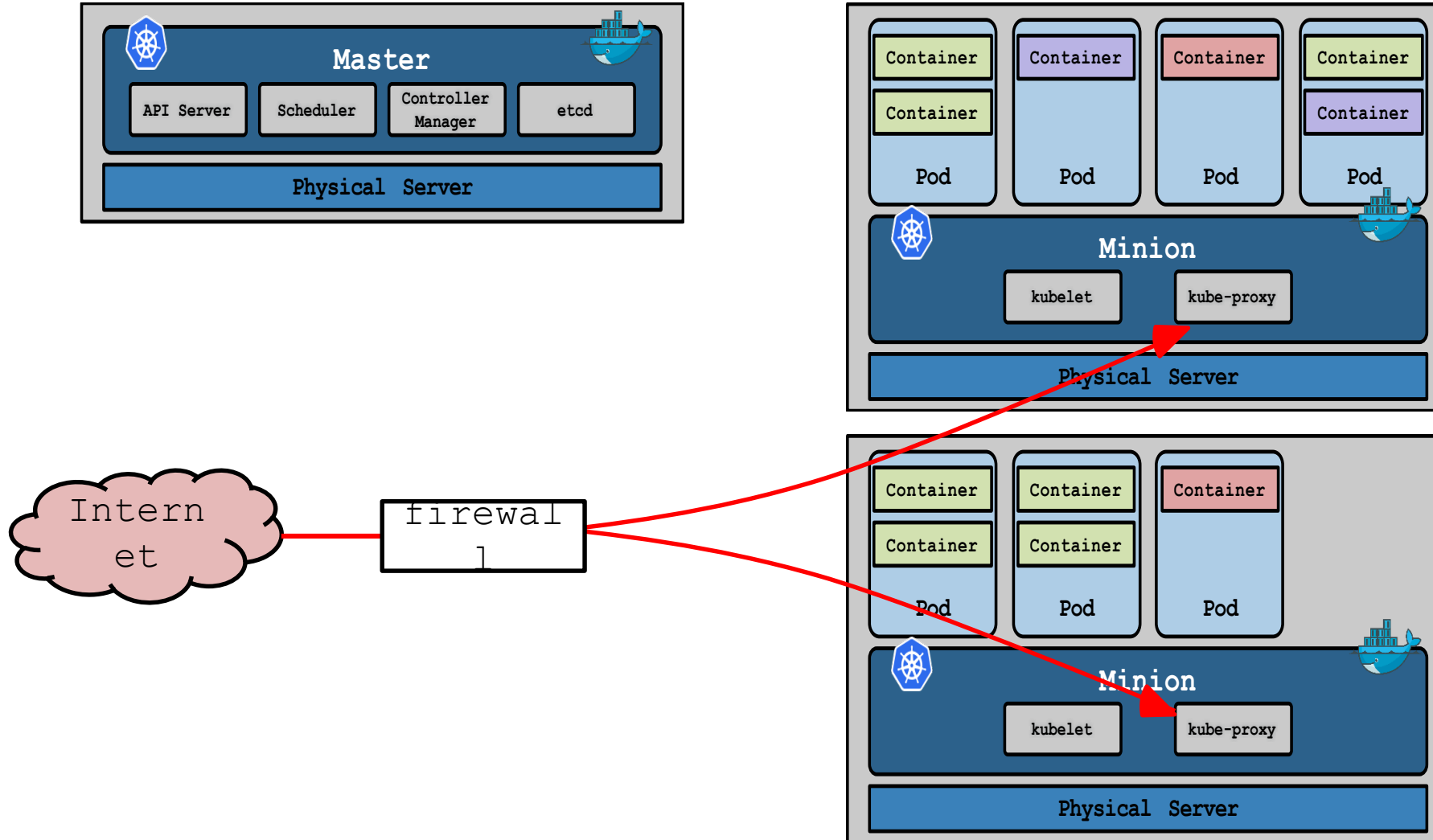
- `kubelet`
The primary "node agent" that runs on each node
- `kube-proxy`
The Kubernetes network proxy that runs on each node
- `Pods`
Single instance of an application, constructed by one or more containers



Kubernetes Cluster



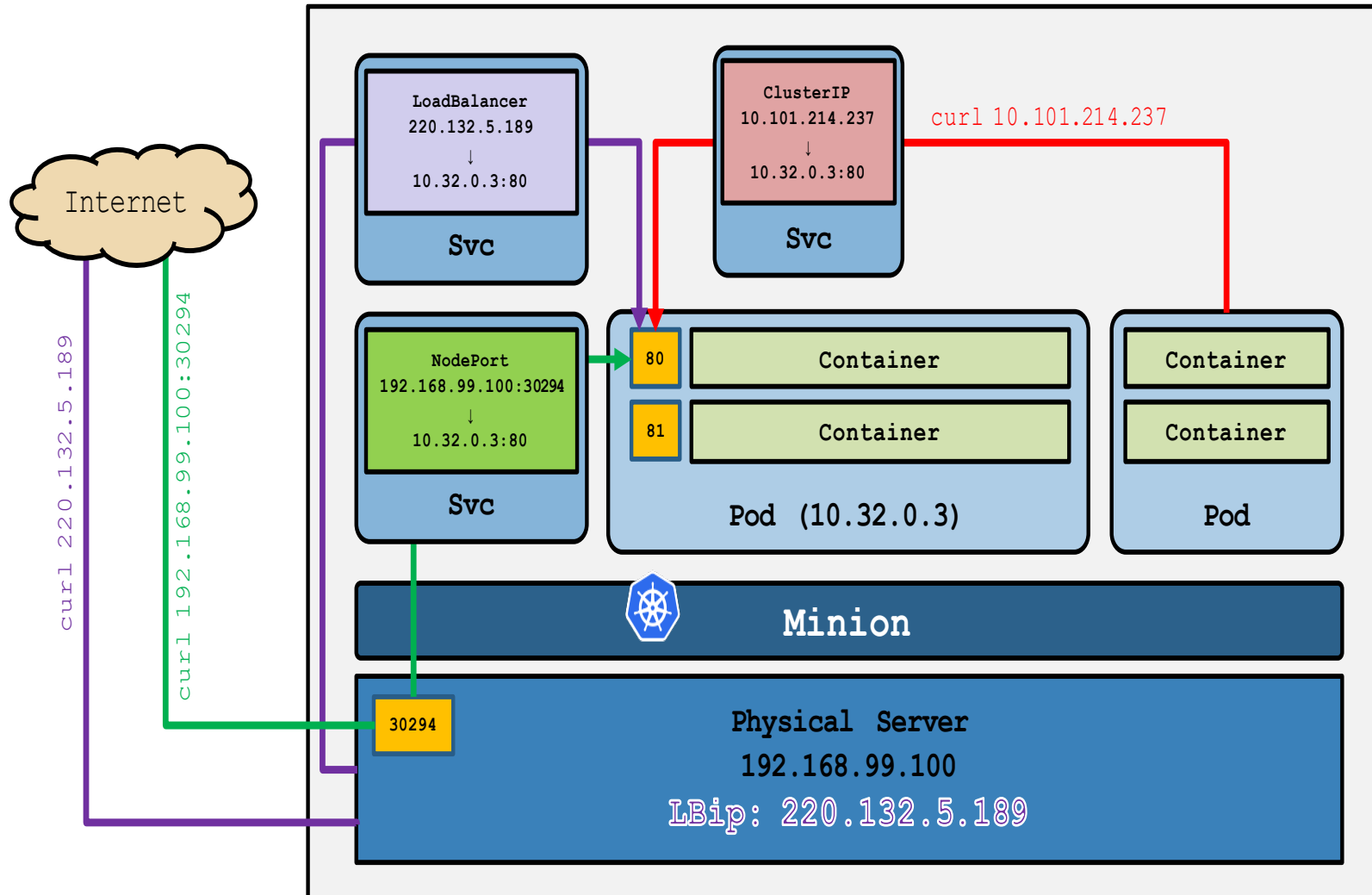
Kubernetes Cluster



K8S Concepts & Terms

- Pods (po)
- Label
- Service (svc)

Concepts & Terms



外國政府雲端規劃

美國政府雲端政策

 An official website of the United States government [Here's how you know](#) ✓



Federal Cloud Computing Strategy

Cloud Smart

CIO Council Actions

From Cloud First to Cloud Smart

The **2018 Federal Cloud Computing Strategy – Cloud Smart** – is a long-term, high-level strategy to drive cloud adoption in Federal agencies. This is the first cloud policy update in seven years, offering a path forward for agencies to migrate to a safe and secure cloud infrastructure. This new strategy will support agencies to achieve additional savings, security, and will deliver faster services. [Read the Federal Register Notice here.](#)

Cloud Smart

Cloud Smart focuses on three inter-related areas to drive cloud adoption through building knowledge in government and removing burdensome policy barriers.



Security

Modernize security policies to focus on risk-based decision-making, automation, and moving protections closer to data.



Procurement

Improve the ability of agencies to purchase cloud solutions through repeatable practices and sharing knowledge.



Workforce

Upskill, retrain, and recruit key talent for cybersecurity, acquisition, and cloud engineering.



Foundation Cloud Hosting Services

[Cloud Home](#) [Strategy](#) [Portfolio](#) [Contracts](#) [FCHS](#) [FAQ's](#) [Contact](#) [Reading](#)

The DOI Cloud Program / Essential Characteristics of Cloud

Share

Essential Characteristics of Cloud

Organizations will be able to measure and only pay for the IT resources they consume. Control over usage gives agencies the flexibility to match requirements and budget constraints, and leverage the shared underlying capacity of IT resources.

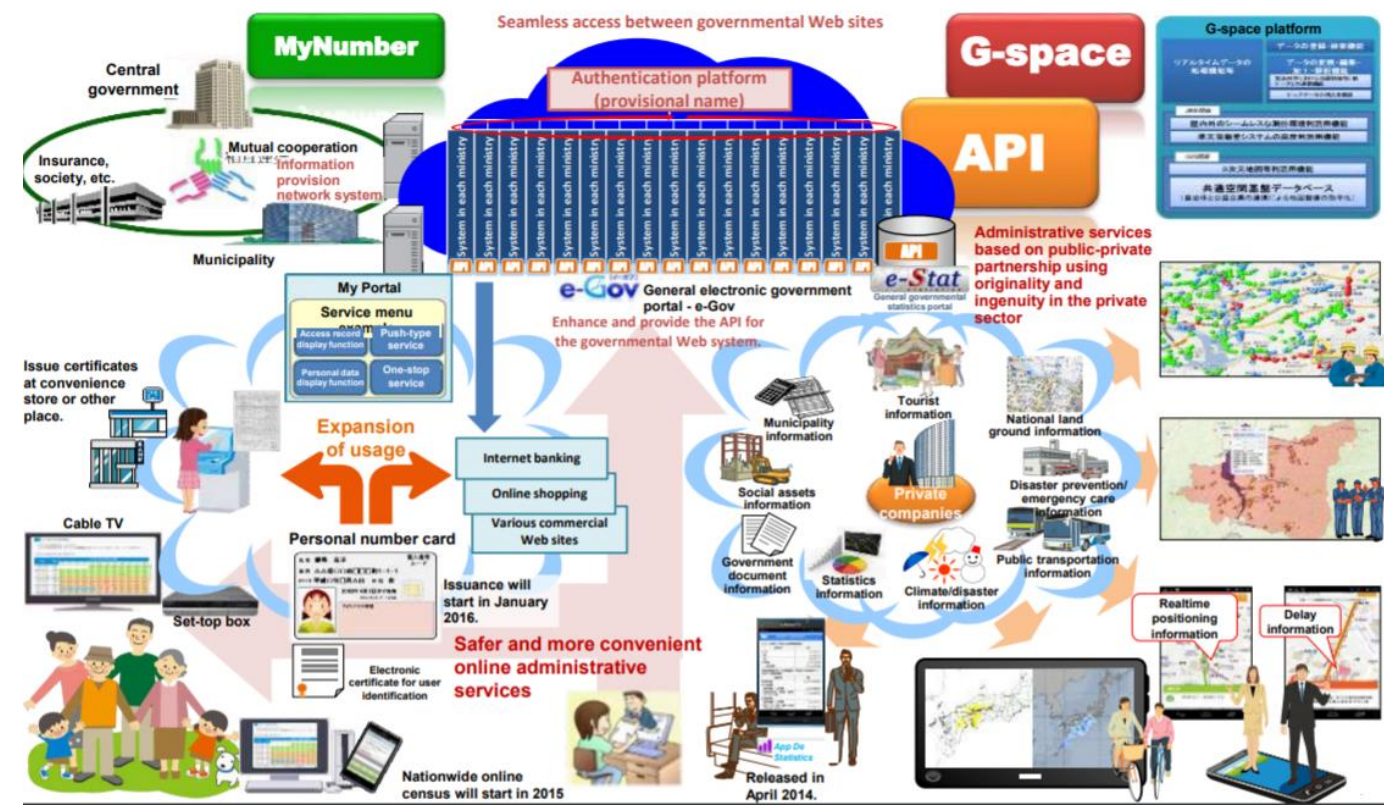
Cloud Characteristics and Benefits:

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services). Other benefits include:

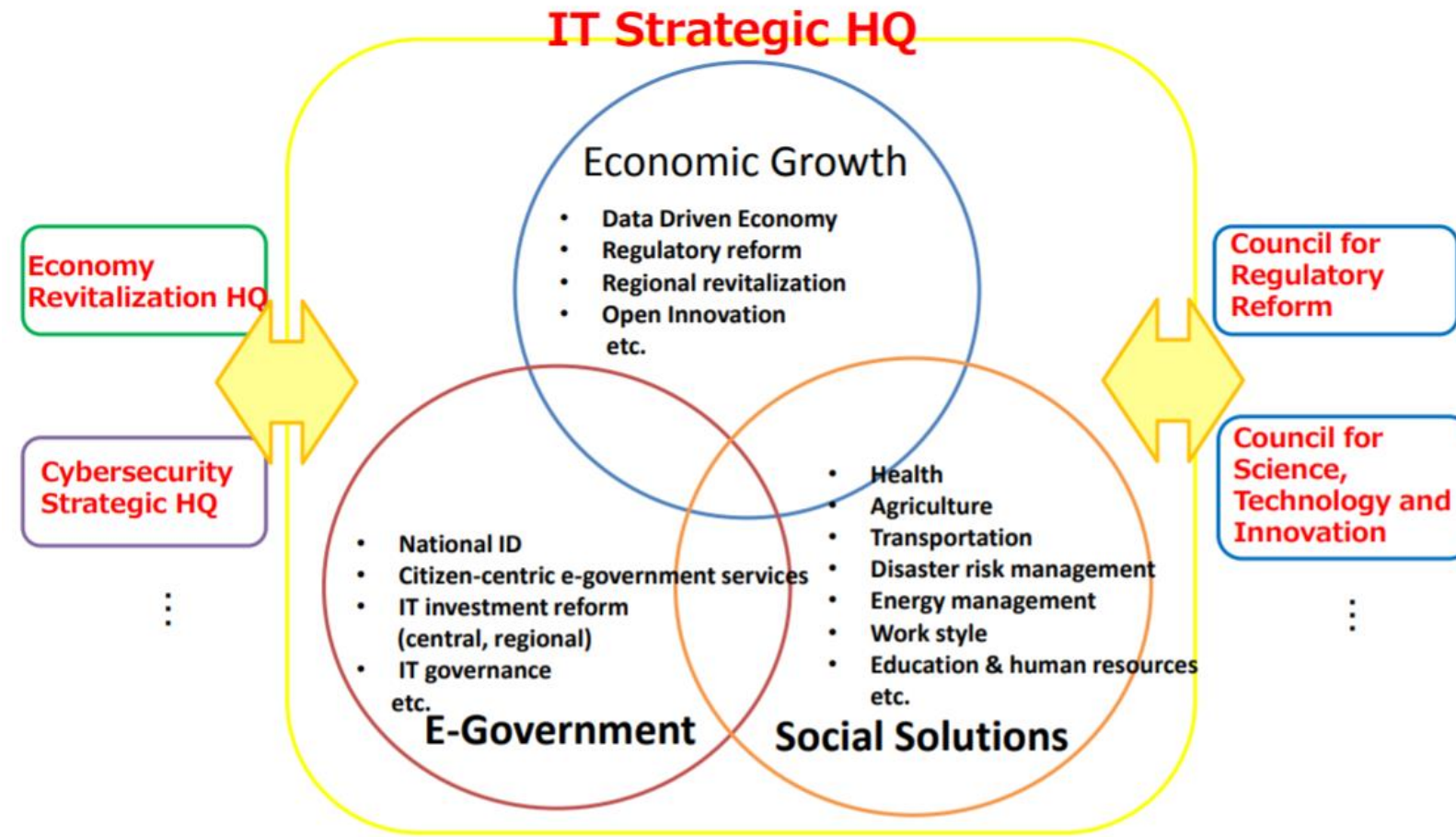
- **Efficient and Scalable:** Computing resources can be rapidly provisioned and released with minimal management effort or service provider interaction.
- **Reliable and On-demand:** Resources are dynamically-allocated and released using a fully automated process.
- **Agile and Elastic:** Network access available from anywhere with an Internet connection. Common resources build economies of scale, high efficiency infrastructure drawn from a common pool.
- **Available and Accessible:** On-demand access through a self-serve web interface.
- **Cost-efficient and Resourceful:** Services are metered, like a utility, where users pay only for services used and they can be cancelled at any time. Cloud services provide for reduced upfront capital expenditures.
- **Productive and Measurable:** Leveraging of cloud infrastructure allows an agency to launch new initiatives, without having to acquire significant hardware, lowering the time and cost barriers to deployment.

日本政府雲端政策

Future Image 2020 –Services-



Position of IT Strategic HQ and Recent Issues



Contents

Basic data

1. IT Strategy

2. Digital Government

Service for citizens
Platform
IT governance

3. Open Government

Transparency
Participation
Collaboration
Interactive service

4. Open Data

Transparency
Participation
Collaboration
New Service

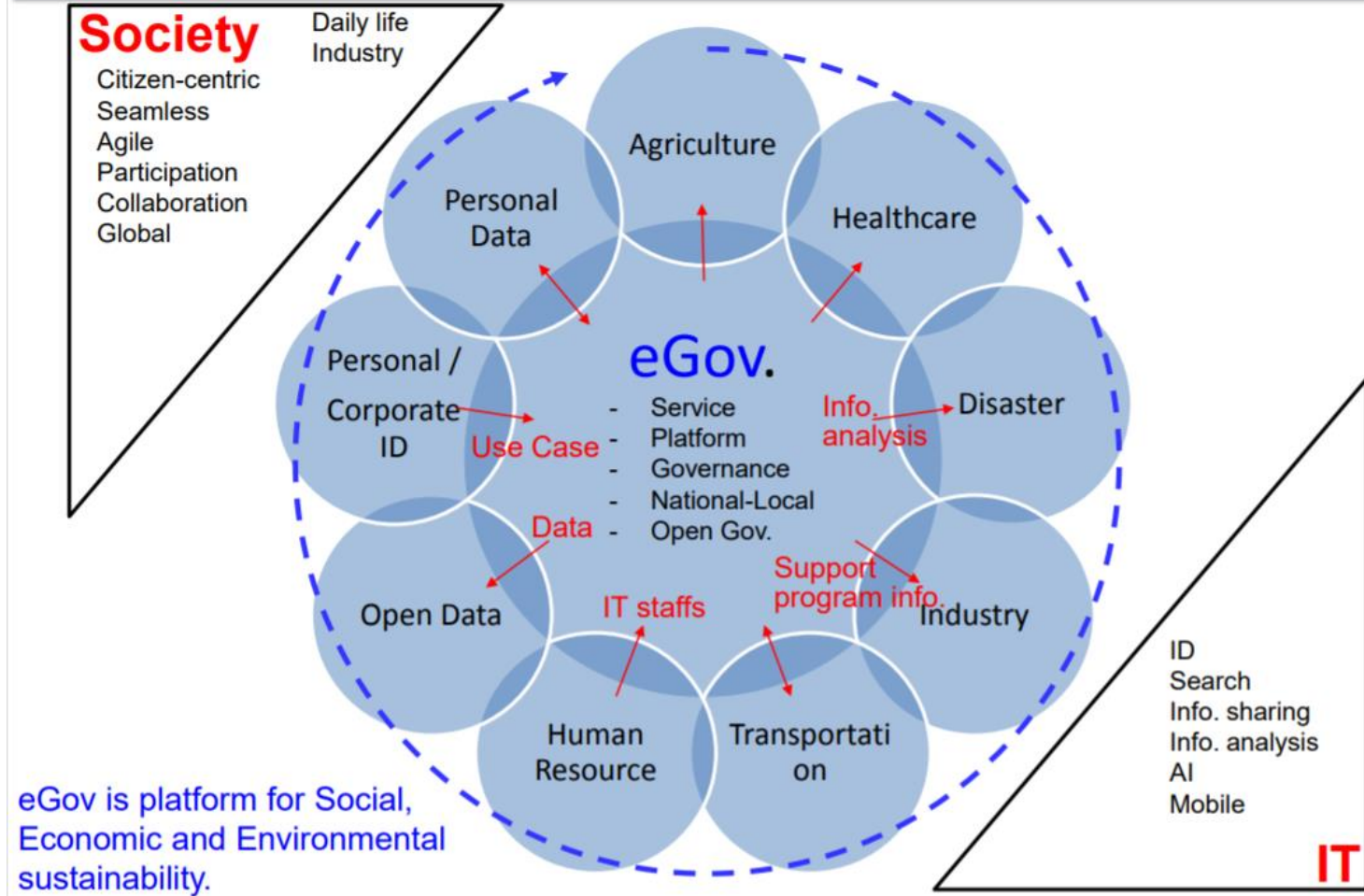
5. Challenges

Vision: Society 5.0(Super Smart society)

- Society5.0, Super Smart Society, is a society vision in Japan.
 - It is necessary to aim at “systemization” of services and businesses, system advancement, and coordination between multiple systems.
 - Therefore, we will promote the measures needed to develop a common platform for this goal (called “Society 5.0 Service Platform”), through collaboration between industry, academia, and government and the relevant government ministries.



eGovernment working group

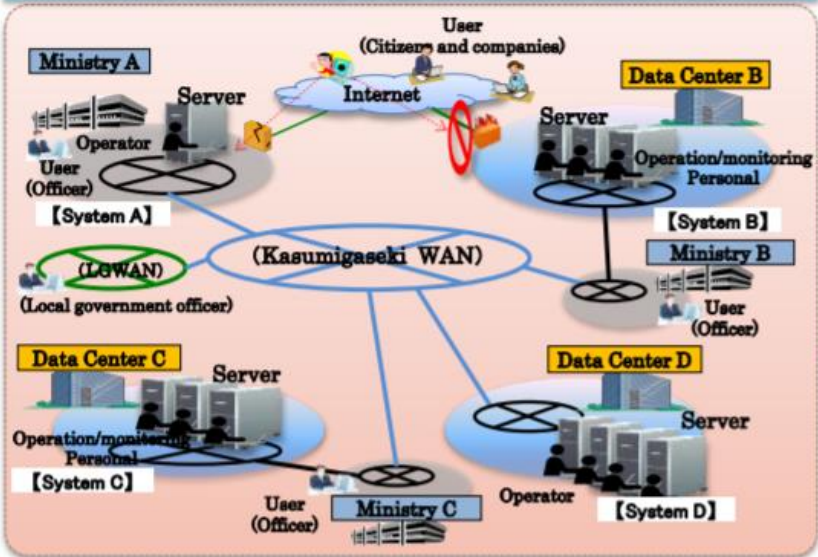


The Government Shared Platform System

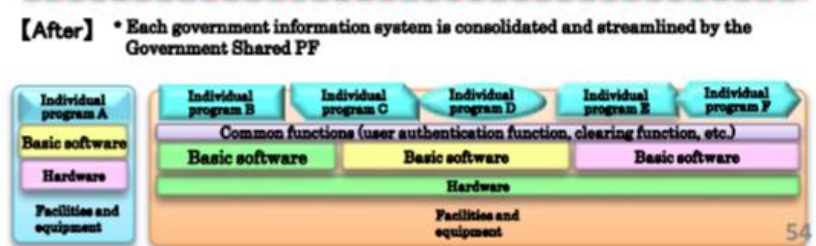
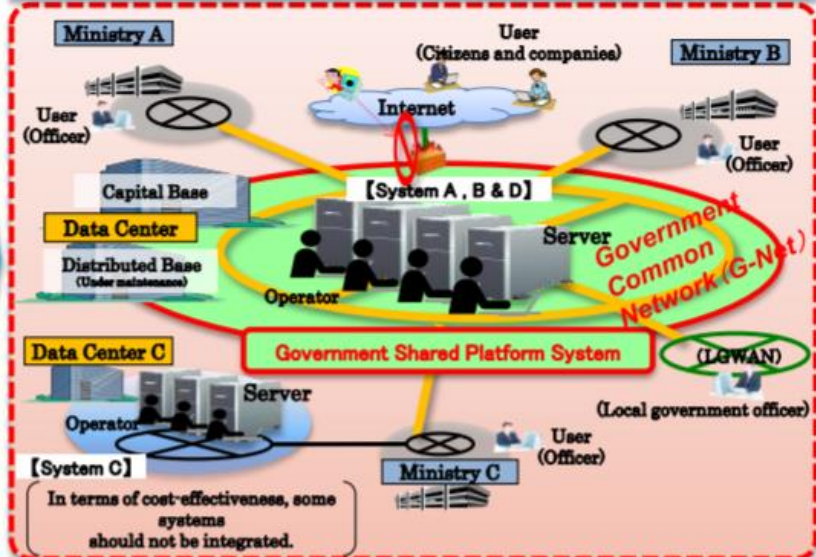
Government information systems ▶ Cloud government information systems (Private Cloud)

- To reduce the total operational costs of the Government Information System
- To strengthen security measures against disaster and unauthorized access
- Started operation on March 18, 2013.

Before consolidation of the Government Shared PF



After consolidation of the Government Shared PF



2.Streamlining and Rebuilding of Information Infrastructure

Elimination and consolidation of government information systems and adoption of cloud services

- 1,450 governmental information systems
- Integration into cross-ministry platform

Review the roadmap every fiscal year to promote acceleration and expansion.

⇒ FY 2018: -579, FY 2021: -601
⇒ FY 2018: 252, FY 2021: 300

Acceleration/
expansion and
enhancement

Kasumigaseki
Cloud

Reduction in costs for large-scale system

- Work with the ruling party (IT strategy special committee) to create a cost reduction plan.

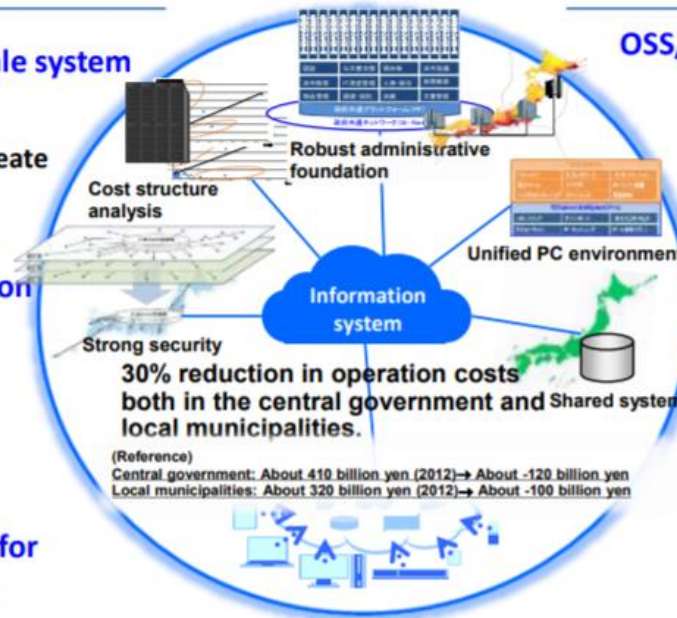
Elimination, consolidation and reorganization of communication network

- Creation of reorganization policies in FY 2014

Virtualization of network

Acceleration of cloud services for municipal information system

- Double the number of local municipalities that use cloud services by FY 2017 using the introduction of number system as a motivator.
- Promote the reform of municipal information systems in line with the progress of nationwide roadmap.
- Promote to share and consolidate the hardware in the municipal intermediate server for the number system within FY 2015 (Over 99% of organizations are expected to share and consolidate their hardware).



OSS/virtualization and introduction of government license

- Reduction in development costs
- Use cloud services for office tools and unify the PC environment.
- Promotion of remote and mobile systems

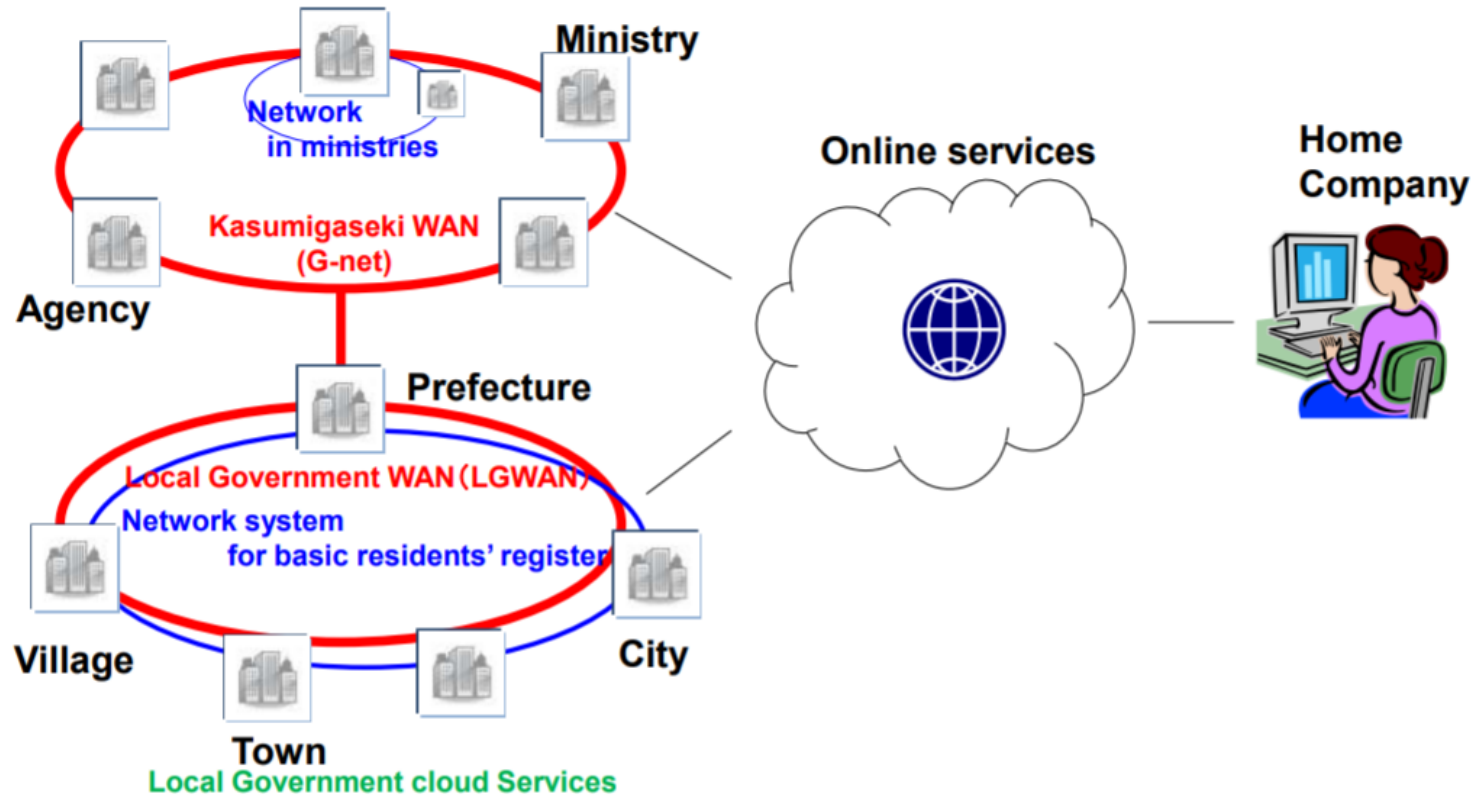
* OSS: Open Source Software

Avoidance of duplicate investment in municipal systems

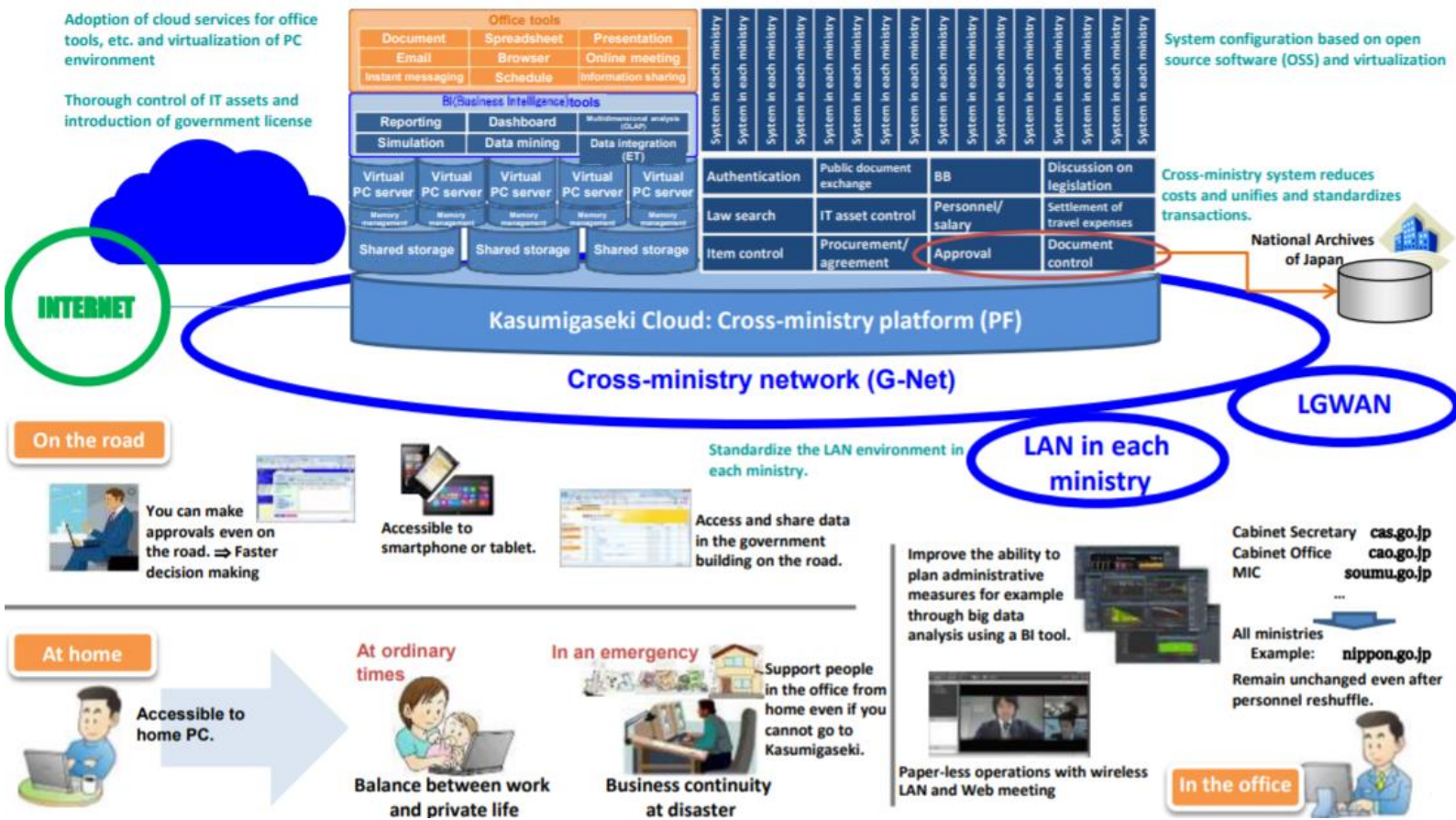
- In principle, a cross-municipality shared system is built at once to automate municipal paperwork across Japan.

Cooperation between the central and local governments

- Government-wide network connects to the Local Government WAN
 - Cloud services.
 - Secure communication

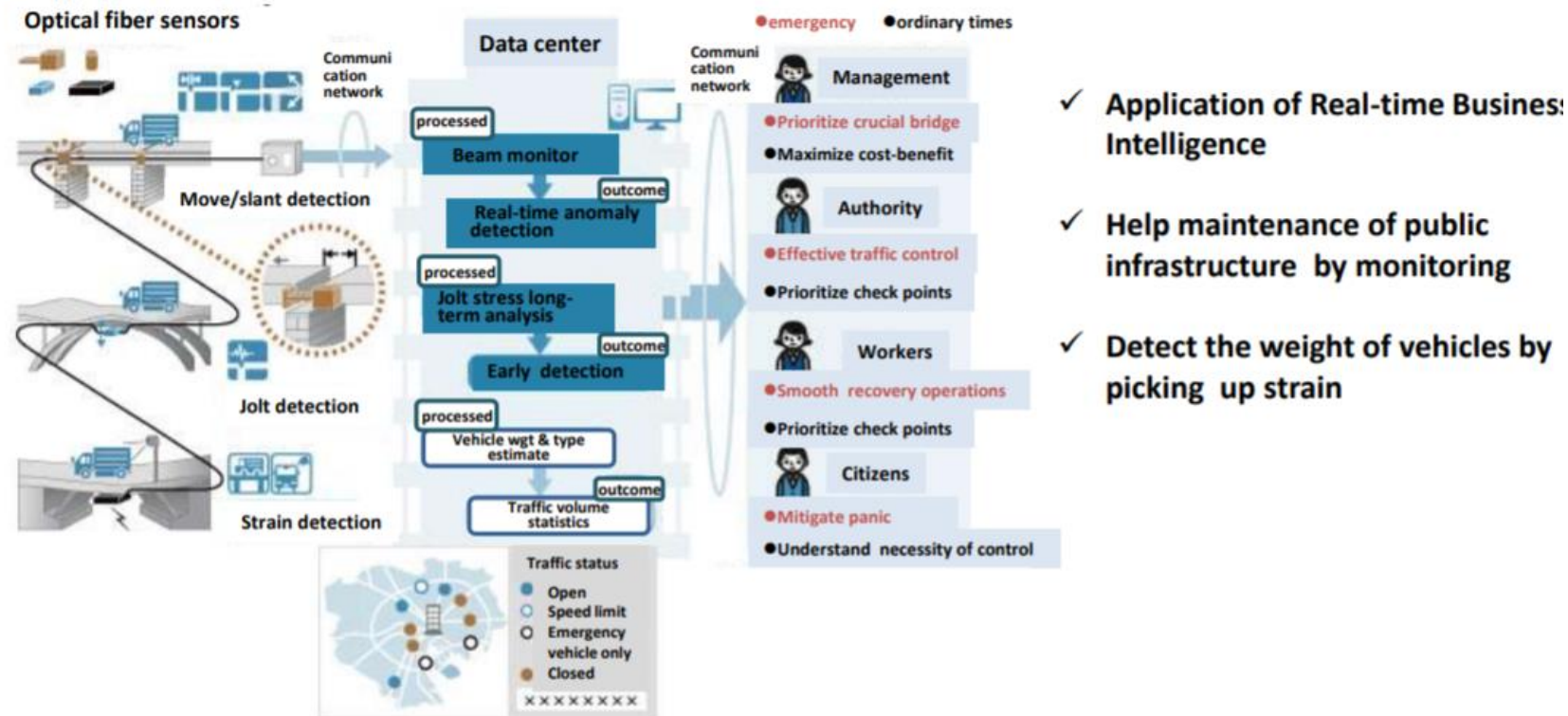


Future Image 2020 -Work Style-



Bridge Monitoring System

- Based on the sensor network and Business Intelligence, Bridge Monitoring System detects strain of the bridge and constantly assesses its structural health of bridges.
- The system is developed and maintained through public-private



Source: <http://www.nttdata.com/jp/ja/lineup/brimos/>

英國 政府雲政策

G-Cloud framework

To find technology suppliers and purchase services that are affiliated with the U.K. Government G-Cloud, public sector organizations can use the Digital Marketplace.

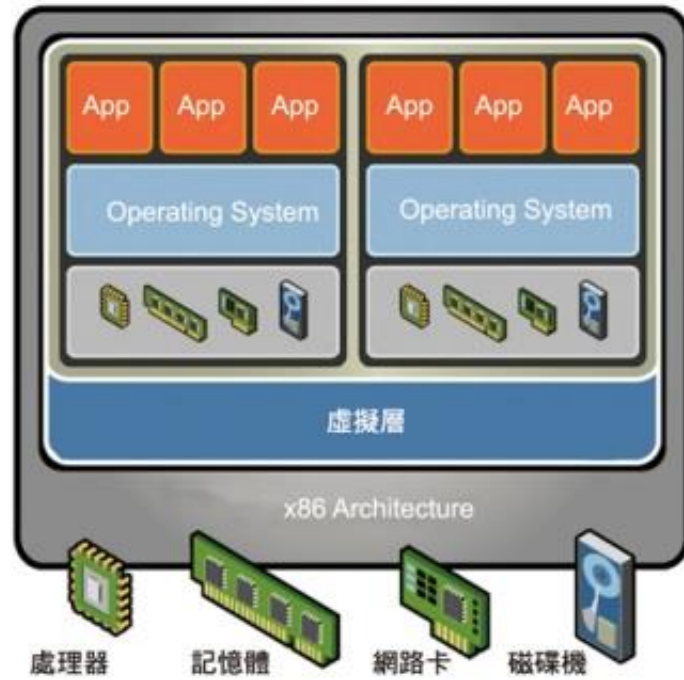
Within the G-Cloud framework, organizations can choose from three categories of cloud services:

- **cloud hosting:** infrastructure-as-a-service ([IaaS](#)) and platform-as-a-service ([PaaS](#)) offerings;
- **cloud software:** software-as-a-service ([SaaS](#)) applications; and
- **cloud support:** support and maintenance services for cloud hosting and software.

Beyond G-Cloud, public sector organizations can use the Digital Marketplace to purchase services that fall under two other frameworks from the U.K. government: the Digital Outcomes and Specialists framework and the Crown Hosting Data Centres framework

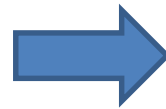
政府數位轉型： 由虛擬化到雲端之路

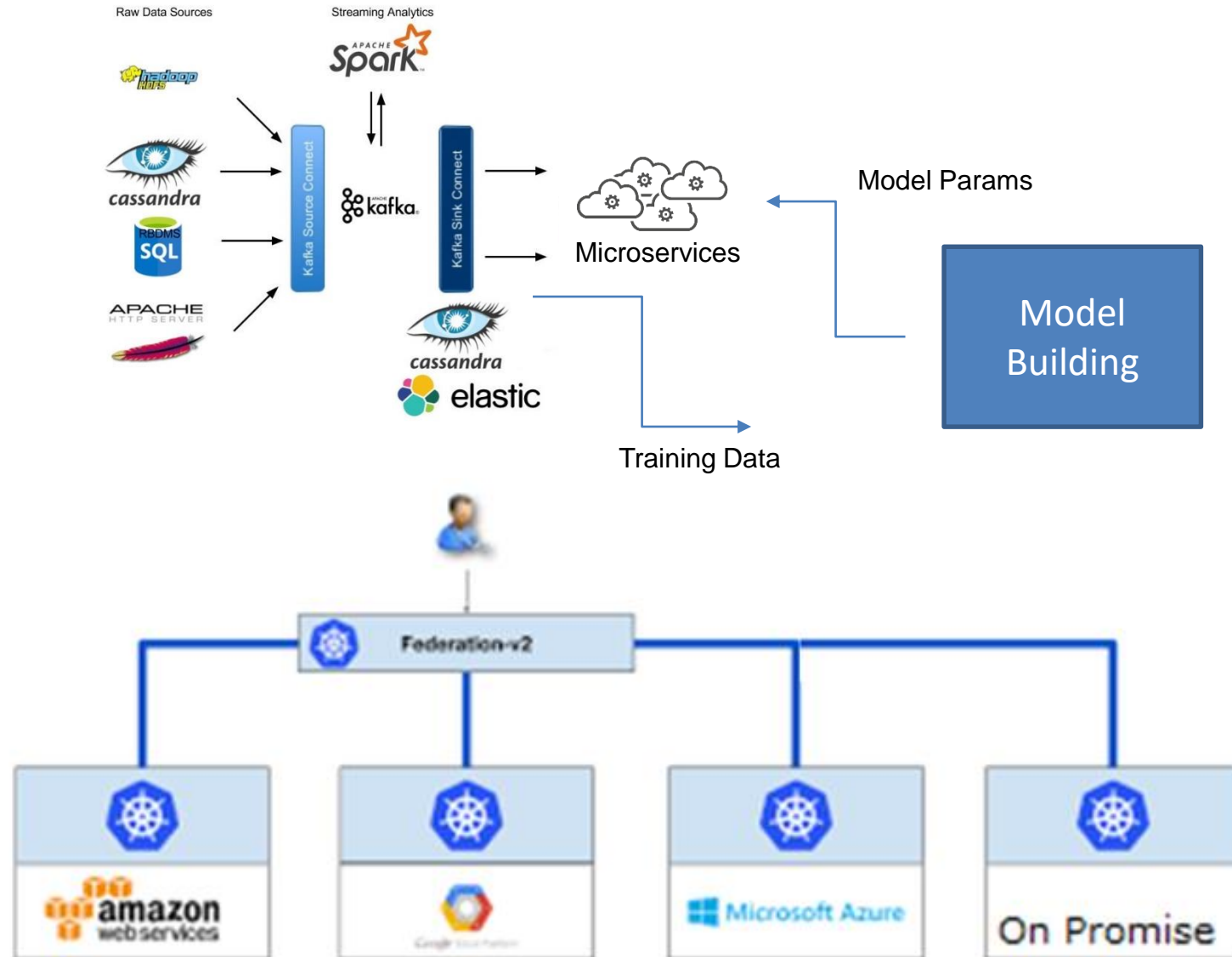
虛擬化基本架構圖



資料來源：Check Point · DIGITIMES整理 · 2009/9

vmware®

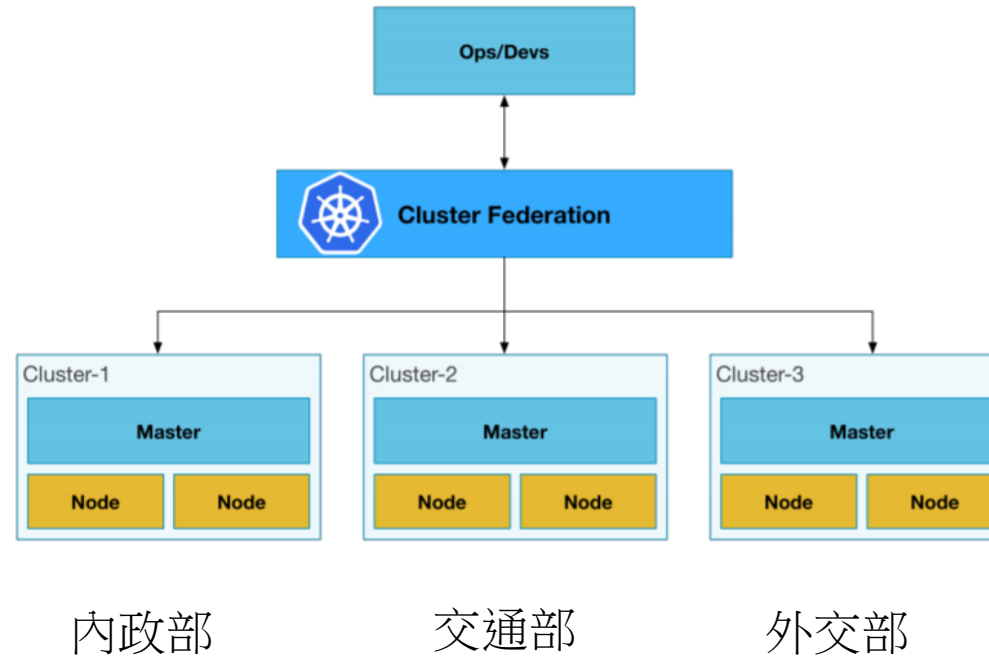




Federation

Federation makes it easy to manage **multiple clusters**.

- **Sync resources across clusters:** Federation provides the ability to keep resources in multiple clusters in sync.
- **Cross cluster discovery:** Federation provides the ability to auto-configure DNS servers and load balancers with backends from all clusters.



Fundamentals to A Successful Microservice Design

- **The Scope Of Functionality**
- **High Cohesion Combined With Loose Coupling**
- **API Integration**
- **Unique Source Of Identification**
- **Data Storage Segregation**
- **Traffic Management**
- **Automating The Process**
- **Minimal Database Tables (Preferably Isolated Tables)**
- **Constant Monitoring**

Hybrid Cloud - One Cloud Many Pieces

