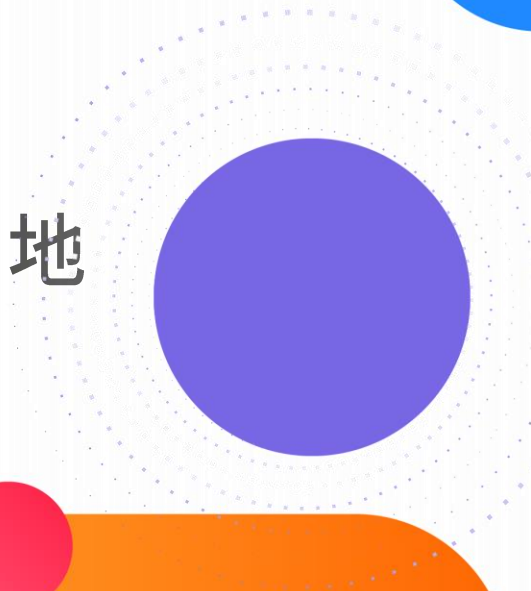
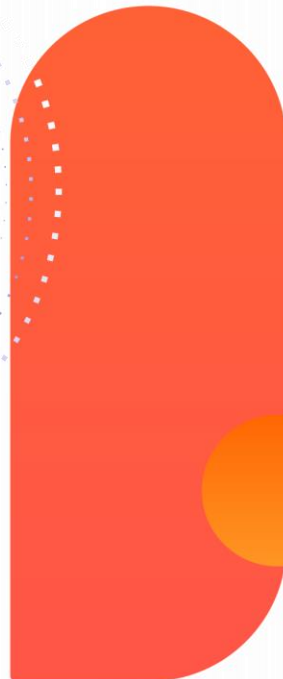
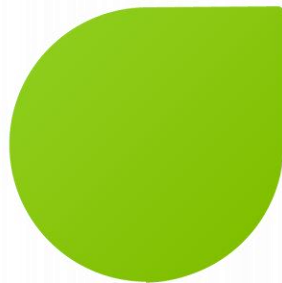


英特尔助力云原生技术落地

陈彤

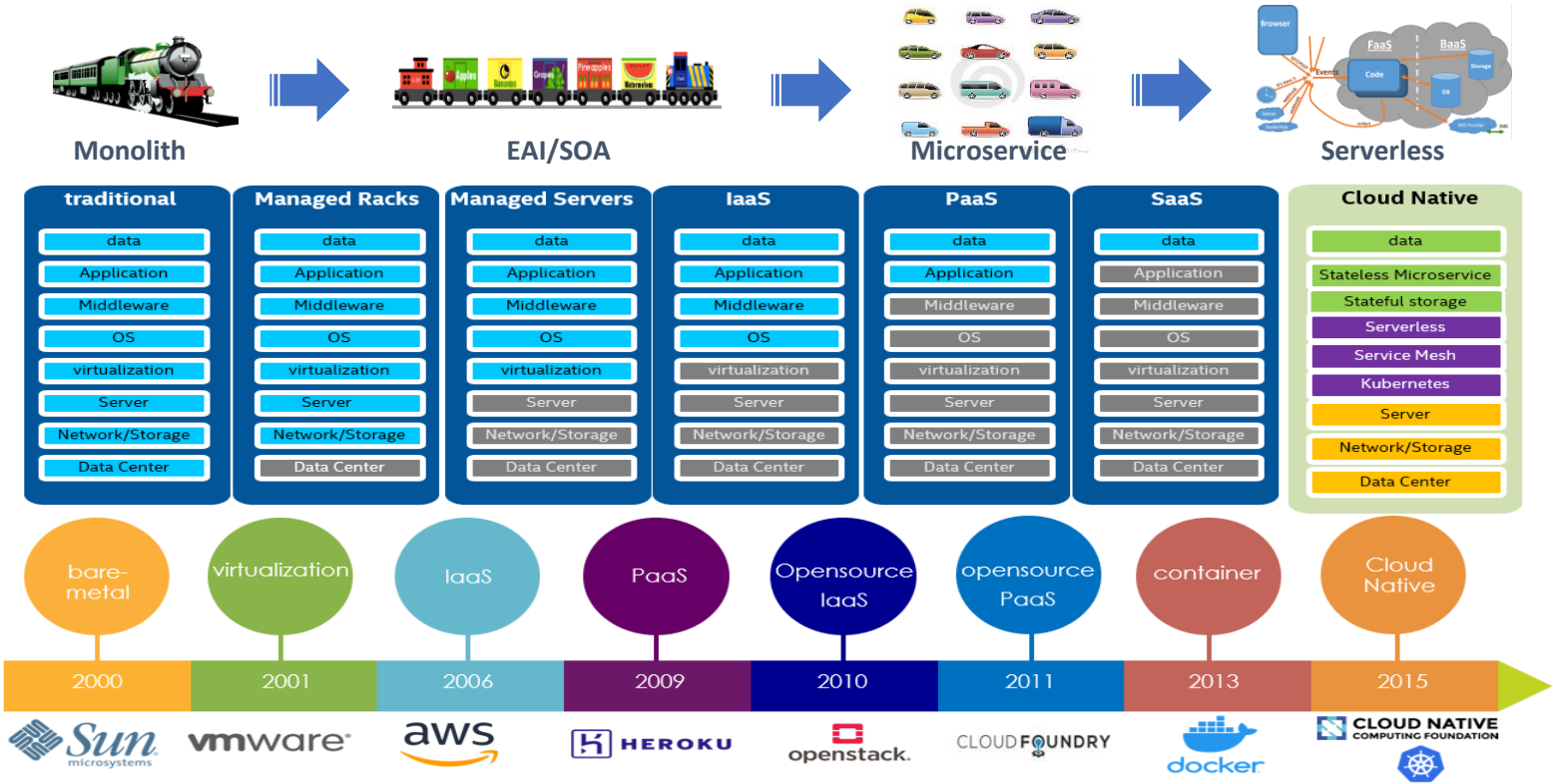
云计算解决方案架构师



▶ Agenda

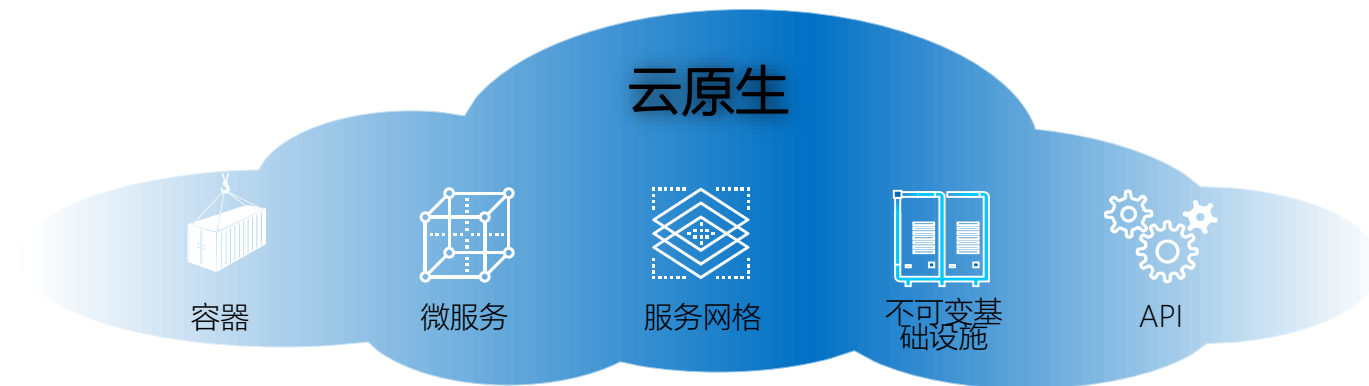
- 云原生产业市场分析
- 云原生技术生态和趋势
- 英特尔技术和方案助力云原生技术落地

云计算/云原生技术演进



云原生技术支撑企业数字化转型

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企业使用云原生技术在现代、动态的环境（如公有、私有和混合云）中
构建和运行可伸缩的应用



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云创新基石

用户正在接受云原生

Enterprise customer starting to adopt cloud native

某保险公司

- Starting from 2017
- Production system
- Running 15 MC system
- 174+ servers, 677+ services, 4827+ containers

某汽车制造企业

- Starting from 2018
- Partner with Tencent (Alauda)
- 50% new project base on Cloud Native
- 8+ Kubernetes clusters
- 2000+ containers

某医疗保障局

- Founded at 2018
- Build their platform base on Cloud Native
- Request all vendors using Micro Service

中国云原生产业市场趋势

中国PaaS市场规模及增速，2018H2 - 2020H2



Source: IDC Semiannual Public Cloud Services Tracker, 2020H2

2020年下半年，中国PaaS市场规模达到14.2亿美金，同比增长61%，尽管增速持续放缓，但PaaS仍旧是中国公有云中增速最快的子市场

市场亮点和增长驱动因素

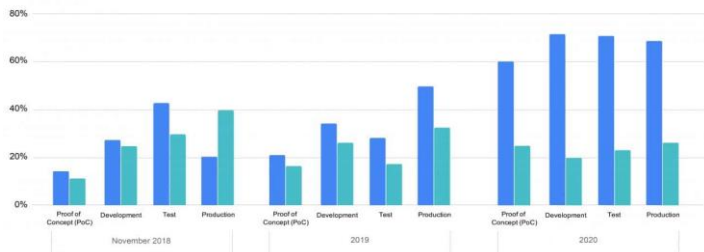
- 厂商加速布局云原生领域，加快完善产品功能和服务
- 低代码开发成为新市场热点，新兴云服务供应商不断涌现，如：简道云、氚云、炎黄盈动
- 传统应用厂商与SaaS厂商持续加强建设PaaS层服务，满足客户对应用系统的灵活、敏捷和个性化的使用需求；当前，与公有云厂商更多的是合作而非竞争
- 2020年以来，**疫情加速了企业数字化转型的步伐，企业业务向云迁移和和业务创新的速度加快**，拉动了大数据、数据库、中间件、人工智能等服务的需求

中国云原生产业市场趋势

- 容器持续迅猛增长，68%的机构在生产过程中使用容器，比去年增长了39%，相比2年前增长240%。
- Kubernetes 已经无处不在，生产中使用 Kubernetes 的比例已从去年的72% 增长到了82%。
- 自动化程度持续提高，30% 的机构生产使用自动化发布周期，73% 运行 CI/CD 流水线。
- 可观察性工具被广泛使用，95% 的机构使用监控工具，94% 使用日志，85% 使用分布式追踪。

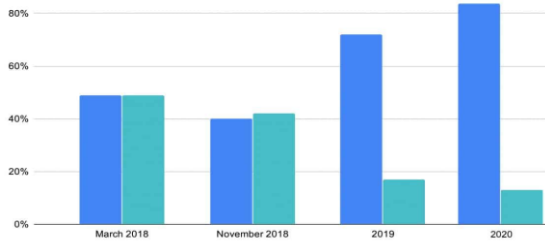
Your organization uses containers for...

Currently Using 正在使用 Future Plans 未来计划使用

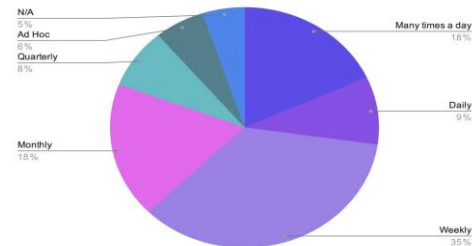


Kubernetes

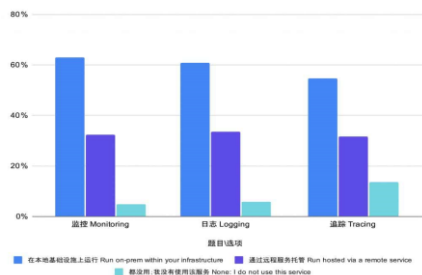
Using in Production Evaluating



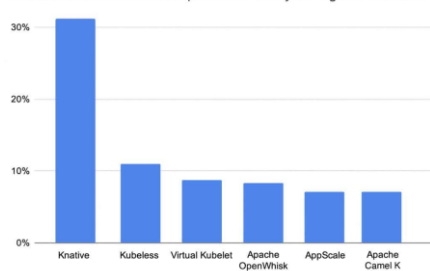
What are your release cycles?



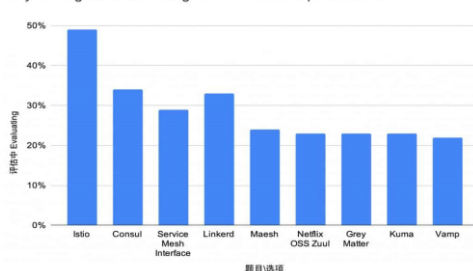
For your monitoring, logging, and tracing solutions, do you require the system to:



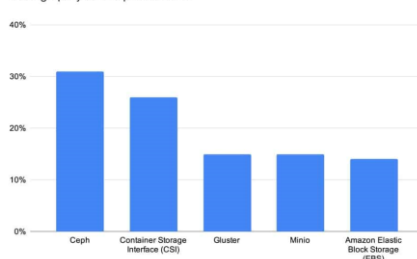
Which installable serverless platforms does your organization use?



Is your organization using service mesh in production?



Is your company/organization using any of these cloud native storage projects in production?

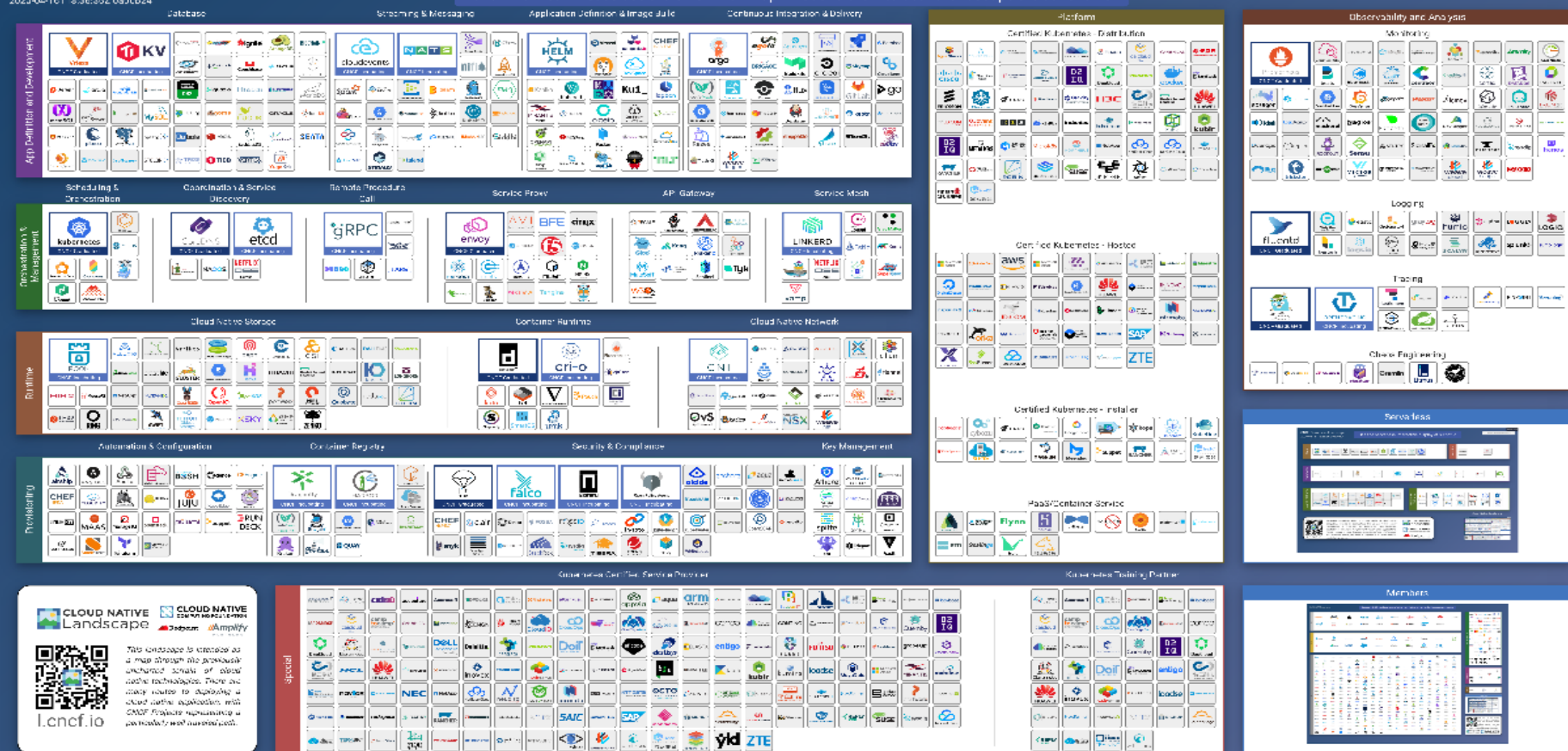


云原生技术生态图景

UCLLOUD 优刻得 | intel

CNCF Cloud Native Landscape
2023-04-10 17:46:52 0931b24

Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at lcnf.io



云原生技术生态图景

CNCF Cloud Native Landscape
2023-04-16 17:43:55Z local time

Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io

App dev & manage

DB, Streaming/messaging, image build & manage, CI/CD

Orchestration & Management

Scheduling & Orchestration, Service Management, RPC, API Management

Runtime

Container Runtime, Cloud Native Storage, Cloud Native Network

Provisioning

Automation, Container Registry, Security, etc.

Platform

Kubernetes
Distribution,
Hosted,
Installer

Other PaaS/Container
solution

Observability

Monitoring
Logging,
Tracing,
Testing

Serverless

Certified Service Provider, Training Partner, Members

CLOUD NATIVE
Landscape

CLOUD NATIVE
Landscape

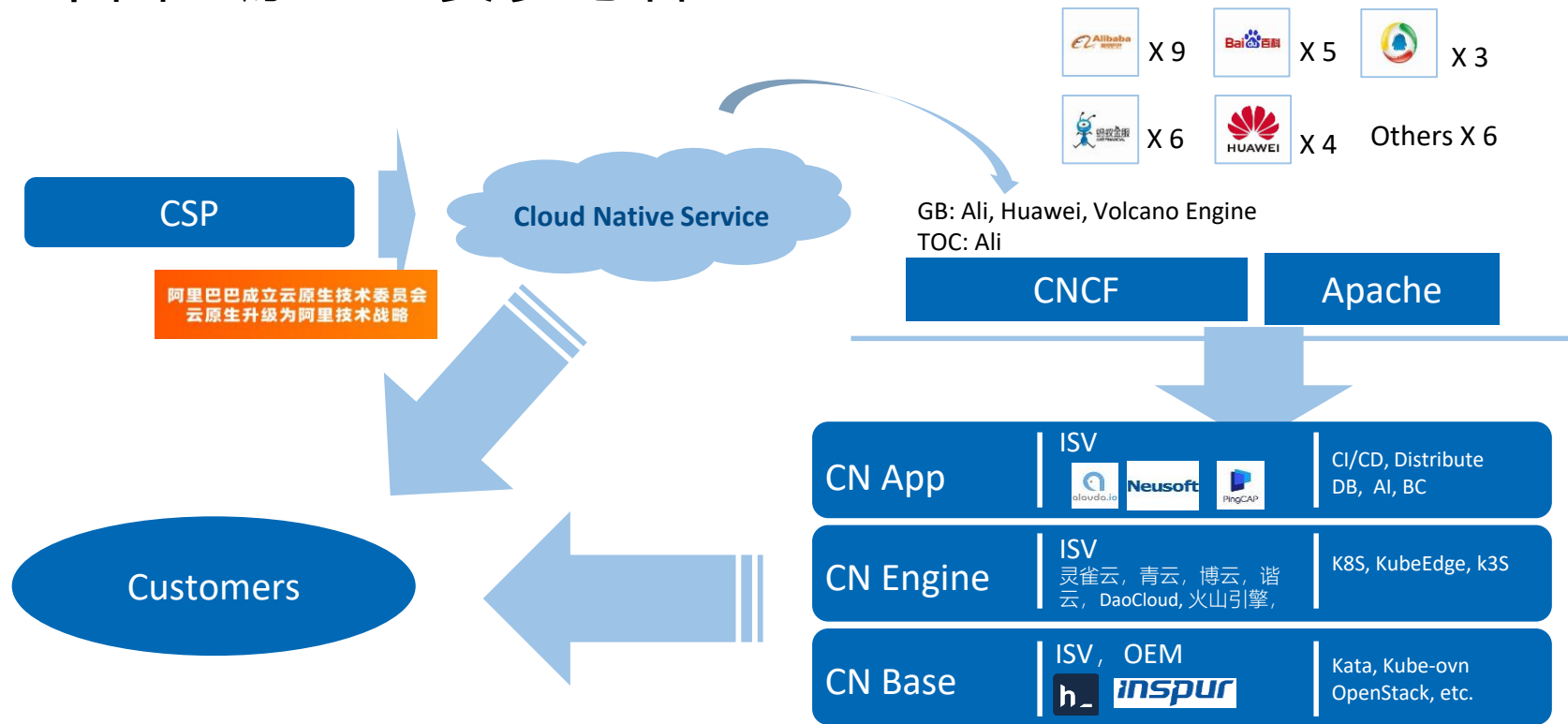


l.cncf.io

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to adopting a cloud native application, and CNCF projects represent a good starting point.

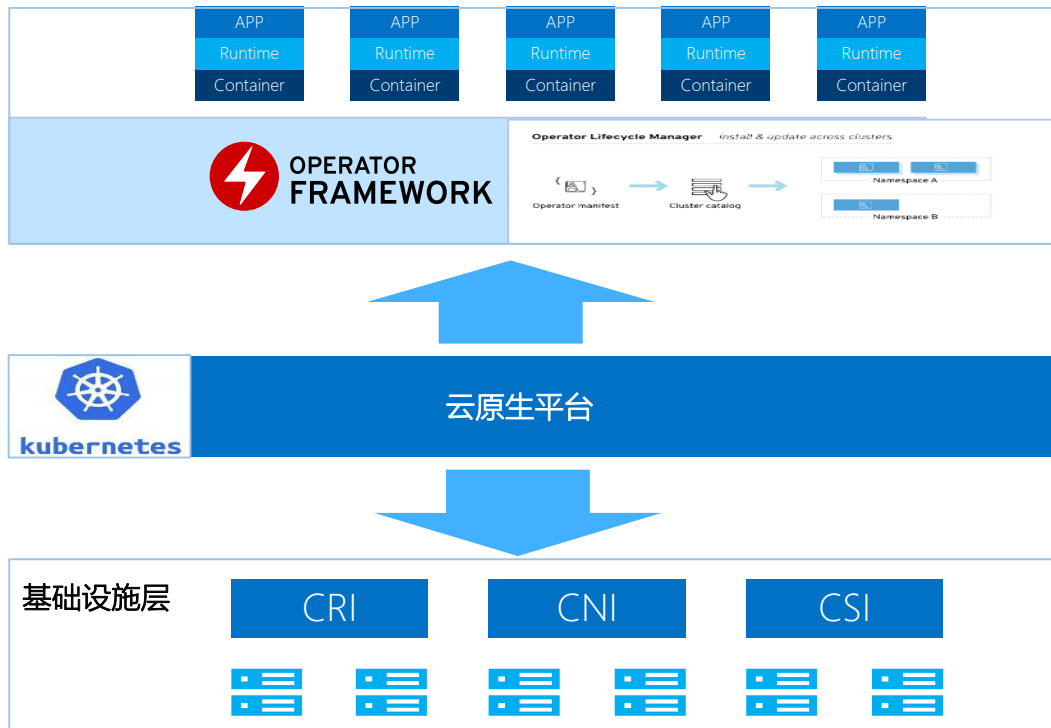
中国云原生主要参与者

UCLLOUD 优刻得 | intel.



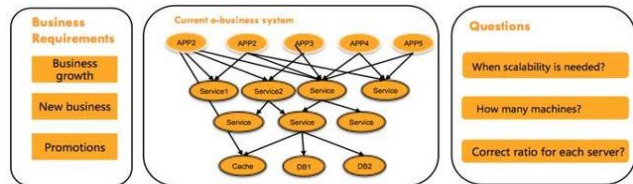
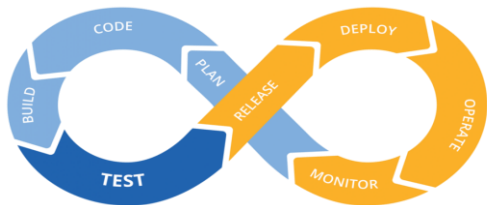
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云创新基石

趋势一：Kubernetes正成为云原生操作系统 UCLLOUD 优刻得 | intel.



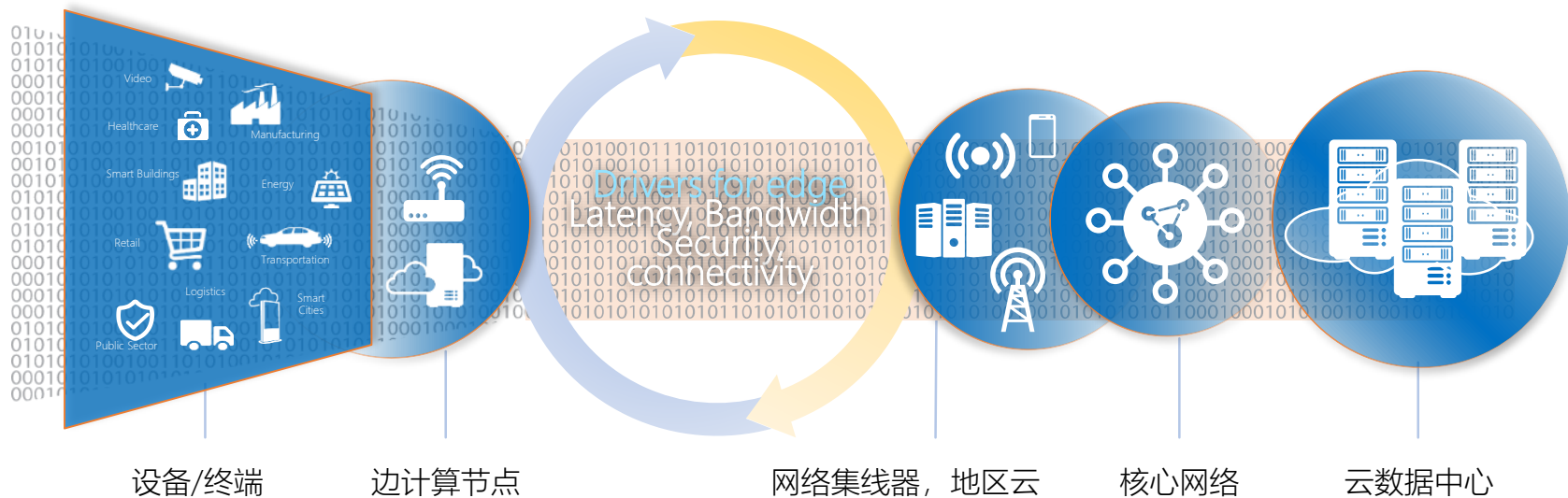
- At the application level, operator and service mesh are becoming pervasive.
- Kubernetes is becoming the standard and management tools are key to different scenarios.
- At the infrastructure level, heterogeneous hardware features are exposed through K8s.

趋势二：云原生技术关注热点



- Container is the best solution for microservice.
- Operator Framework is the best practice of managing container workloads. It brings operation & maintenance knowledges into application.
- Service Mesh is key to microservice governance, covering service upgrade/downgrade, authentication/authorization, trace management, etc.
- DevOps is new IT working model and more easy to implement with cloud native.
- Monitoring solution is more important in cloud native than traditional vm cloud.

趋势三：边缘计算兴起，云原生从数据中心走向云边一体化



- 云原生技术和边缘计算相结合，可以快速实现云边端一体化的应用分发，解决在海量边、端设备上统一完成大规模应用交付、运维、管控的诉求

云原生平台架构

UCLLOUD 优刻得 | intel.



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英特尔助力云原生技术

UCLLOUD 优刻得 | intel



应用



Intel® Media SDK / Media Server Studio Intel® REALSENSE Intel® Movidius Intel® Neural Compute Stick
Intel® SDK for OpenCL™ Applications Intel® Distribution of OpenVINO™ toolkit



应用框架

框架与应用优化 CLOUD FOUNDRY Istio spring NGINX JBoss Red Hat RabbitMQ Jenkins elastic TensorFlow spark

应用开发优化

IA架构优化库

应用分析

集群工具

Intel Parallel Studio Intel System Studio

编译器引擎

编译器运行时

MKL

TBB

Media SDK

MKL-DNN

Parallel STL

DLDT

DAAL

MPI

MLSL

VTune™ Amplifier

Inspector

Advisor

Trace Analyzer & Collector

Cluster Checker



容器编排

kubernetes RED HAT OPENS SHIFT Container Platform HELM TIGERA nuagenetworks PROJECT CALICO flannel etcd Prometheus

容器运行时

容器网络

容器存储

数据资源

katacontainers
intel OPTANE DC SOLID STATE DRIVE
Qemu/Libvirt
intel VT
intel RDT
intel ISS

DPDK SRIOV
MULTUS
intel SMARTNIC
intel ETHERNET
intel SILICON PHOTONICS

intel OPTANE DC SOLID STATE DRIVE
SPDK

数据资源
intel OPTANE DC SOLID STATE DRIVE
DEAR
intel SSD
INTEL 3D NAND SSD



容器基础设施



云类型



处理器



芯片



Intel® Omni-Path



以太网



网络芯片



硅光互联



Intel® SSDs



Intel® FPGA

intel XEON PLATINUM 英特尔® 至强®
云创新基石

英特尔技术优化云原生平台

为工作负载提供最佳性能和安全性，同时简化开发人员体验

计算 & 加速

Node Feature Discovery	在K8s中启用通用硬件功能发现，支持发现CPUID,SSD,SR-IOV,RDT,IOMMU,.....
CPU Manger for K8s	整合CPU Core资源池，将特定的容器化的工作负载绑定到特定类型CPU
Topology Manager for K8s	使其他Kubelet组件能够使用基于拓扑的信息做出资源分配决策
Intel® QAT Device Plug-in	基于硬件的加速处理安全、身份验证、压缩和解密技术，卸载CPU负载
Telemetry Aware Scheduling	基于用户的监测和自定义策略调度和删除工作负载

存储

Persistent Memory CSI Plug-in	K8s对持久化内存支持的插件
-------------------------------	----------------

网络

Multus CNI	容器多网络接口设备管理，以支持NFV等多功能网络划分
SR-IOV CNI	支持SR-IOV功能的高性能网络IO技术
Bond CNI	整合多个网络接口捆绑成一个逻辑网络接口，以最大化网络性能
Userspace CNI	高性能用户空间容器网络方案，支持数据平面网络加速的功能

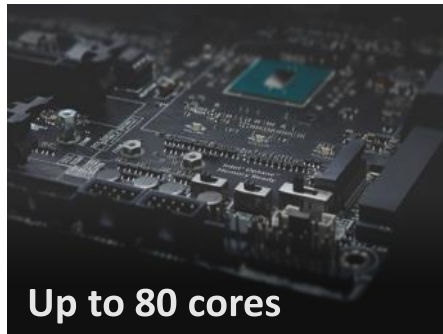
运行时 & 安全

Kata Container	通过虚拟化隔离技术以加强容器的安全可控
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Intel® Xeon® Scalable Platform

UCLLOUD 优刻得 | intel.

MORE CORES, MORE MEMORY, SIMPLE SCALABILITY, AND INTEGRATED TECHNOLOGIES BENEFIT
CLOUD NATIVE PLATFORM



Up to 80 cores

50% more memory than the previous generation and can easily scale to eight sockets in a single chassis.



Intel® QAT

Intel® QuickAssist Technology helps increase efficiency and enhance data transport and protection across the infrastructure.



Intel® AVX-512

Intel® Advanced Vector Extensions can accelerate the performance of mixed workloads.



Intel® RDT

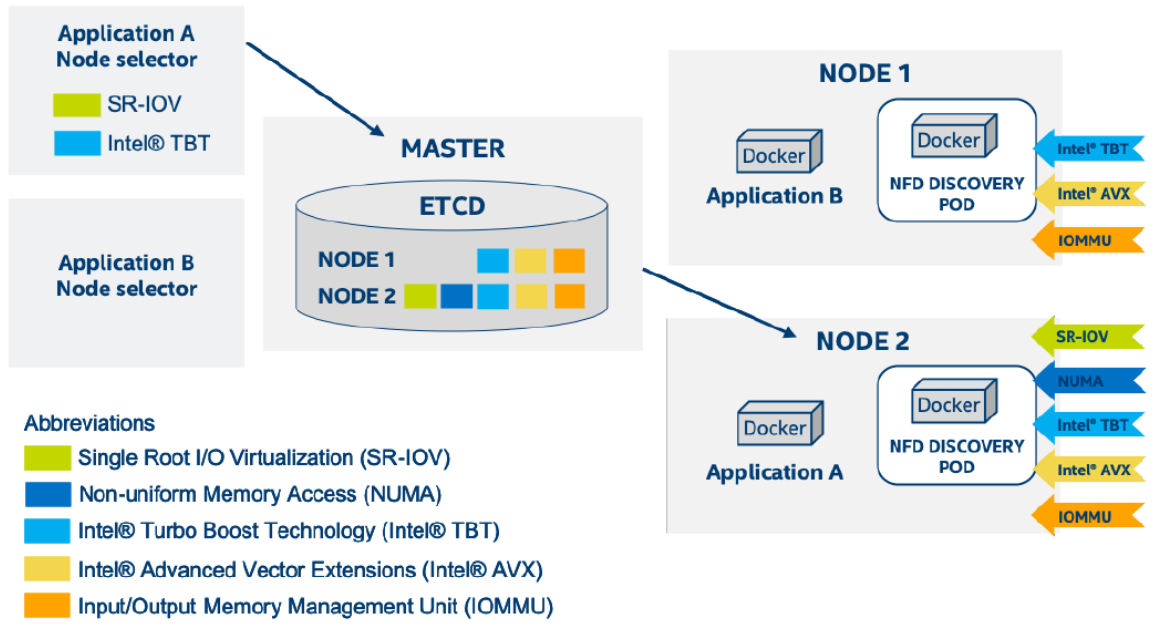
Intel® Resource Director Technology provides smart resource orchestration.



英特尔® 至强®
云创新基石

Node Feature Discovery

NODE FEATURE DISCOVERY IN KUBERNETES

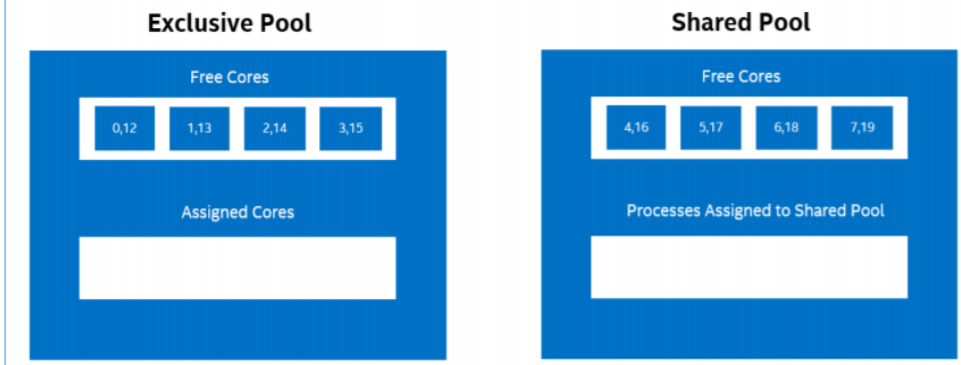


- Node Feature Discovery brings Enhanced Platform Awareness (EPA) in K8s
- NFD detects resources on each node in a K8s cluster and advertises those features
- K8s scheduler schedules workload with node feature tags which was released by NFD

CPU Manager for K8s

Initial Setup

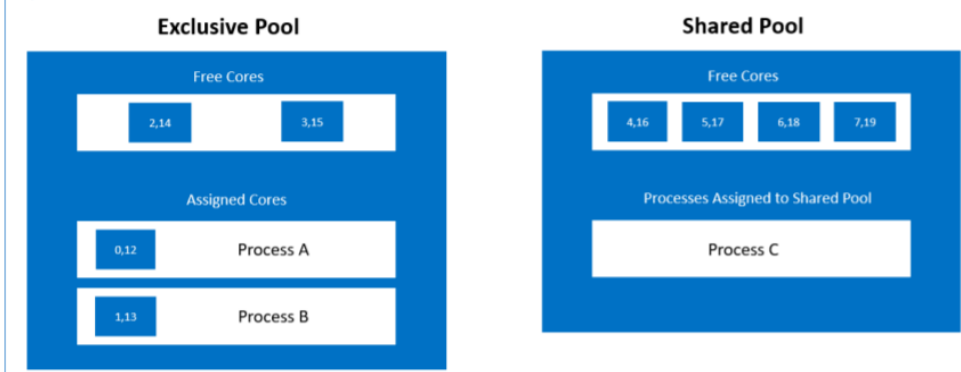
Figure 1 illustrates the initial setup with no processes added. Isolcpus is equal to 0,1,2,3,4,5,6,7,12,13,14,15,16,17,18,19.



After Process Assignment

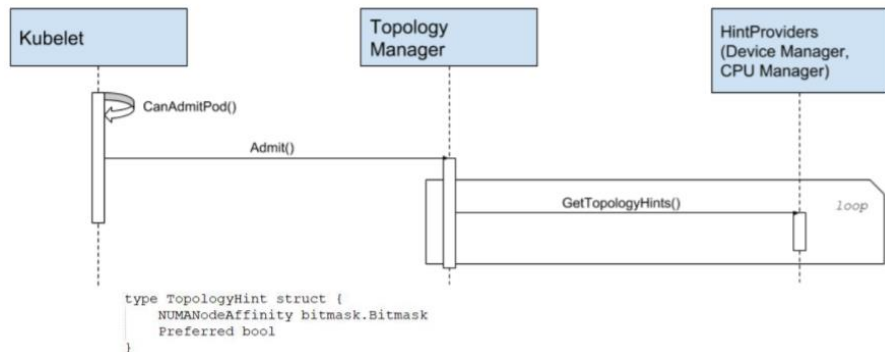
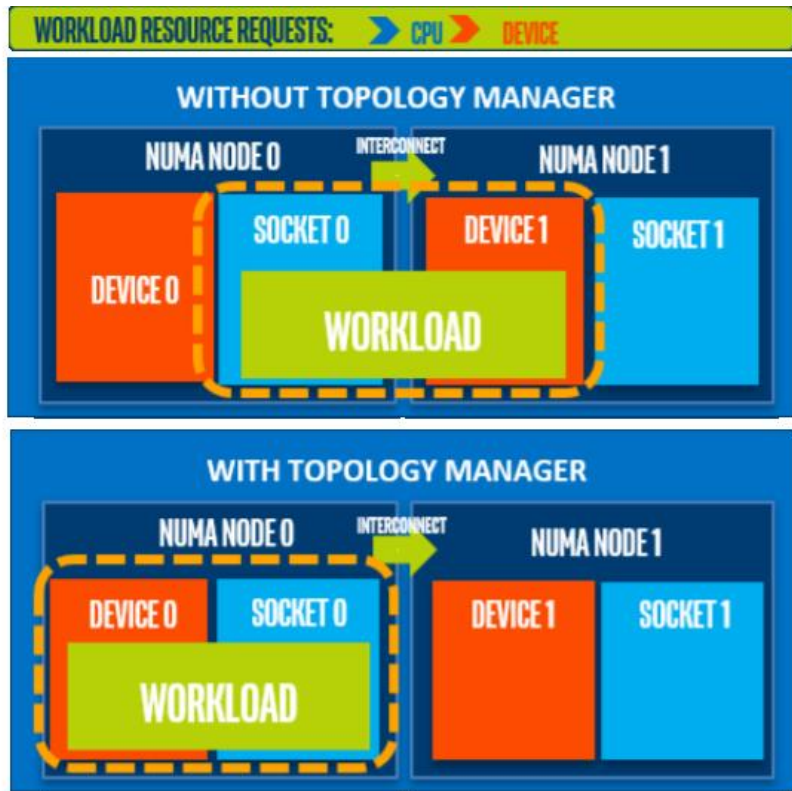
A & B: High priority process / C: Lower priority process

Figure 2 illustrates a snapshot of pools after processes A, B, and C are added from the above scenario.



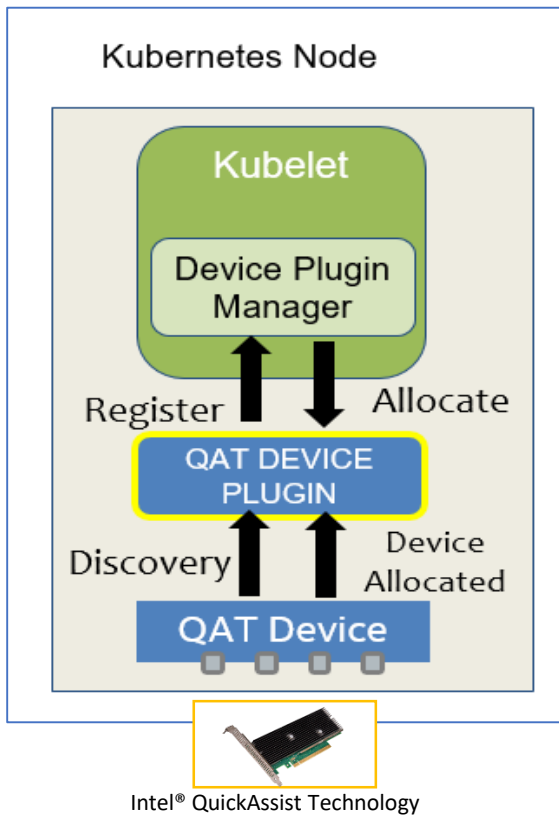
- Guarantees high priority workloads are pinned to exclusive cores
- Gives a performance boost for fastpath workloads & negates noisy neighbour scenario by using cores from exclusive pool (incl. isolcpus)
- Shared cores are assigned for slowpath workloads

Topology Manager for K8s



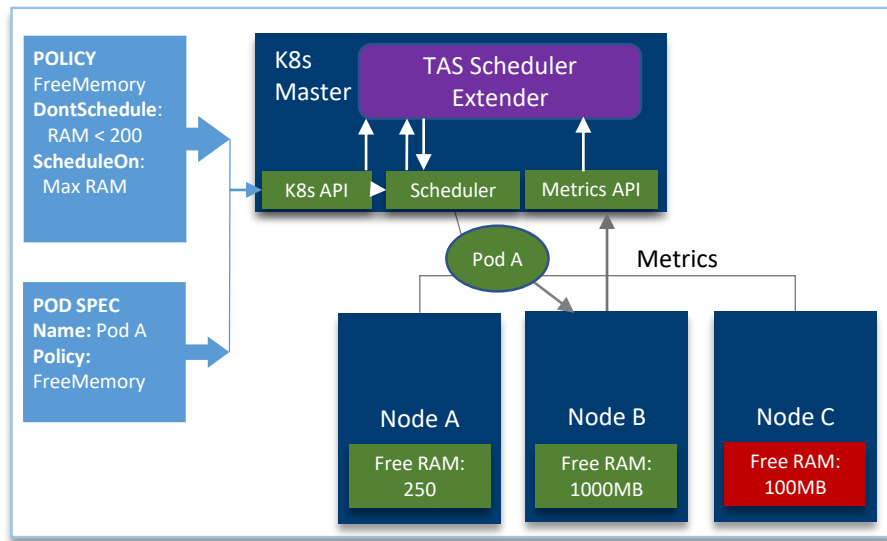
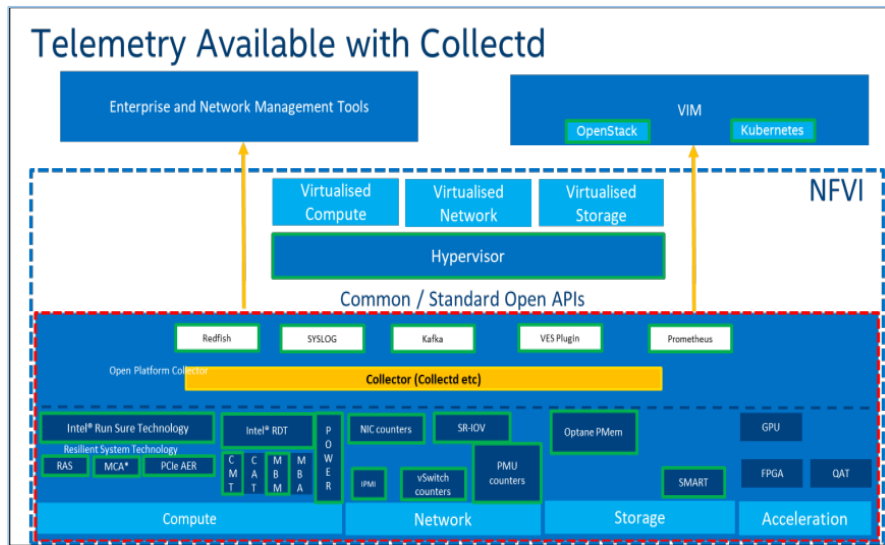
- Topology Manager, a kubelet component, provides an interface to co-ordinate resource assignment on node level
- Manages the resources allocated to workloads in a NUMA topology aware manner

QAT Device Plugin for K8s



- K8s supports Intel QuickAssist Technology:
 - Supports QAT through K8s device plugin
 - QAT device detection and reporting to K8s, then scheduling resource based on workload request.

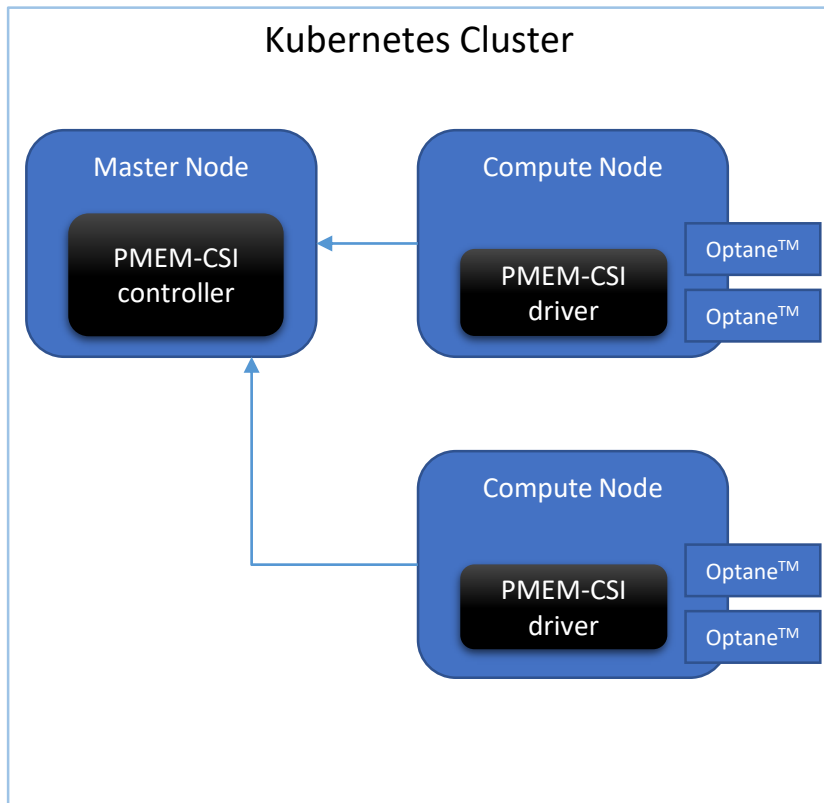
Telemetry Aware Scheduling



- Telemetry Software Stack includes Collectd, Node Exporter, Prometheus, Prometheus Adapter, Grafana. All the components can be deployed via a set of ansible scripts.
- Through a user defined policy, TAS enables rule based decisions on pod placement powered by up-to-date platform metrics.

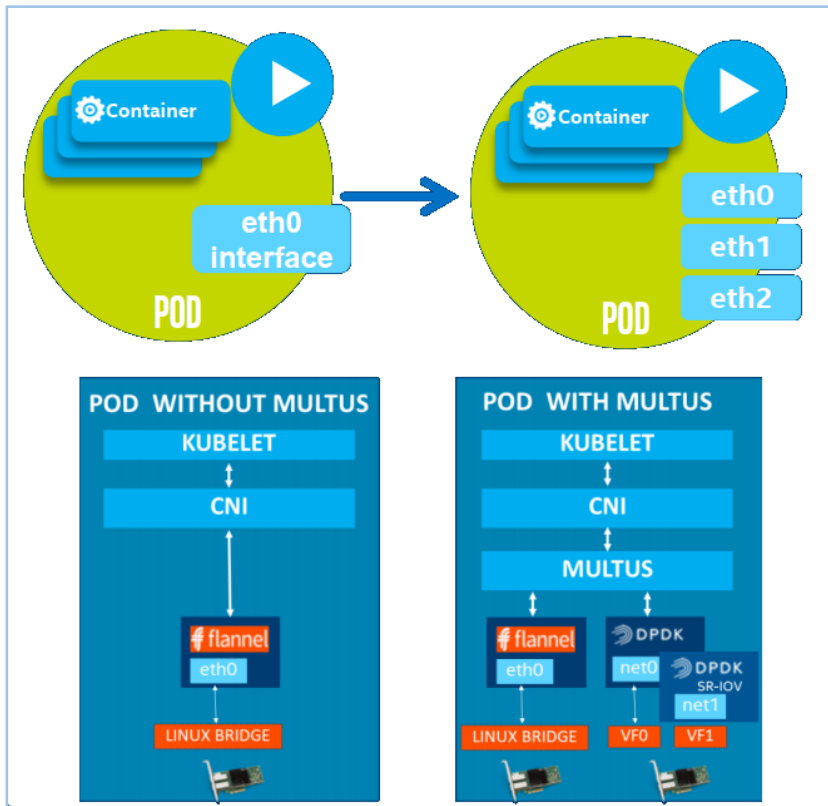
<https://github.com/intel/platform-aware-scheduling/tree/master/telemetry-aware-scheduling>

PMEM CSI for K8s



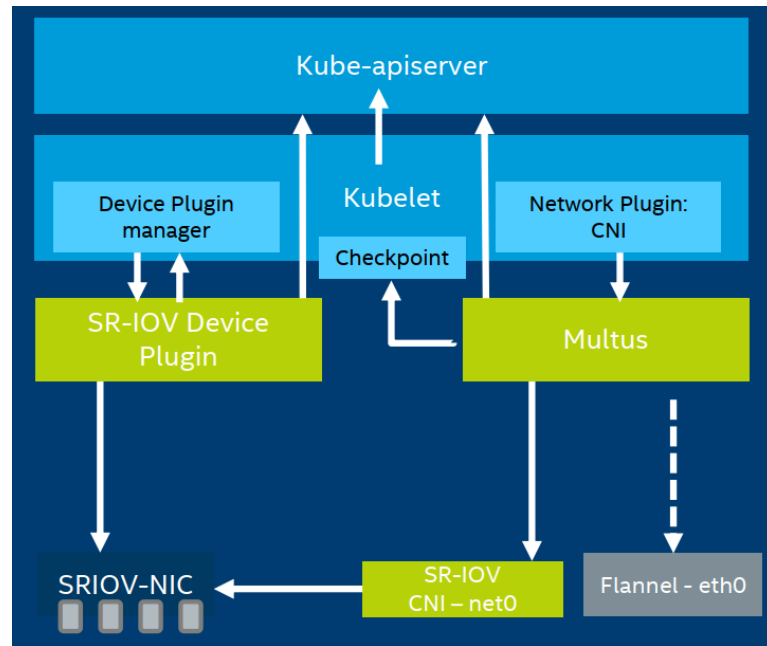
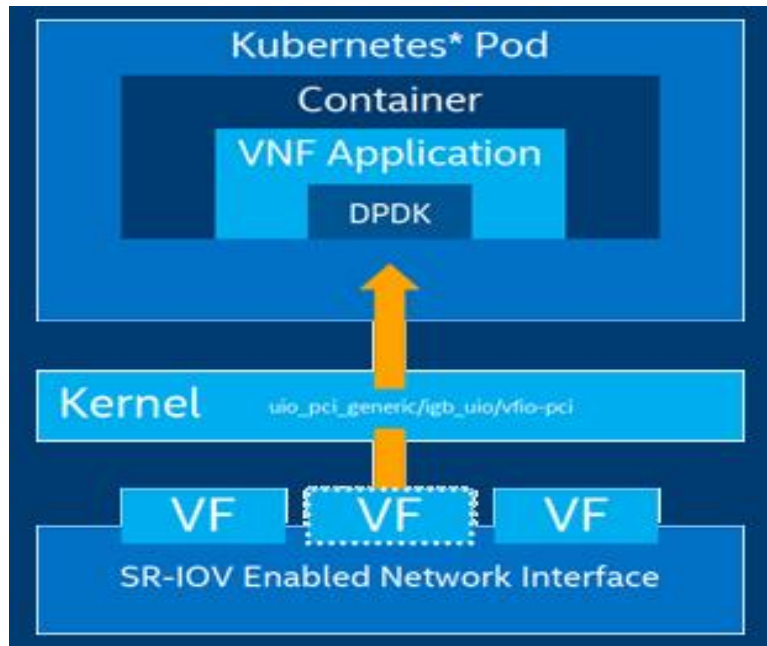
- PMEM-CSI makes Intel® Optane™ DC persistent memory available as a filesystem volume to container applications.
- PMEM volumes are local to a node and thus can only be used on the node where they were created.

Multus CNI



- Multus is a CNI proxy and arbiter of other CNI plugins
- Multus invokes other CNI plugins for network interface creation
 - Master plugin is identified to manage the primary network interface (eth0) for the pod
 - Other CNI minion plugins (SR-IOV, vHost CNI, etc.) can create additional pod interfaces (net0, net1, etc.) during their normal instantiation process

DPDK SR-IOV CNI & SR-IOV Device Plugin



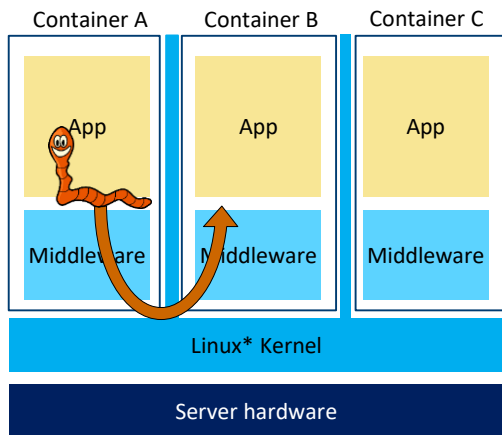
- SR-IOV CNI plugin enables the Kubernetes pod to be attached directly to an SR-IOV virtual function (VF).
- SR-IOV Network device plugin discovers and exposes SR-IOV network resources as consumable extended resources in Kubernetes.

<https://github.com/k8snetworkplumbingwg/sriov-cni>

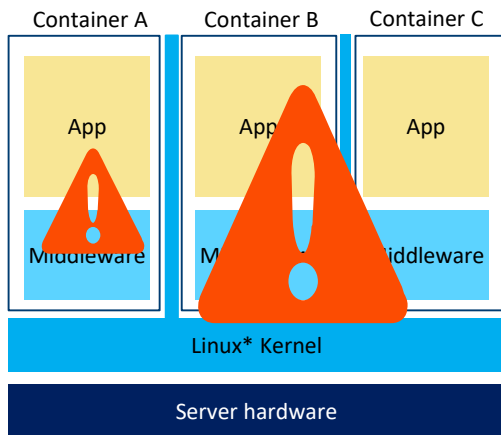


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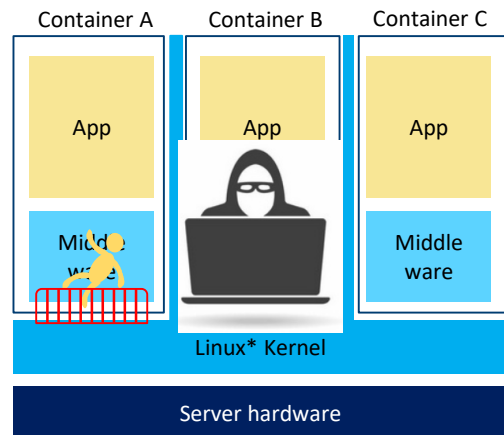
云原生上的安全和隔离



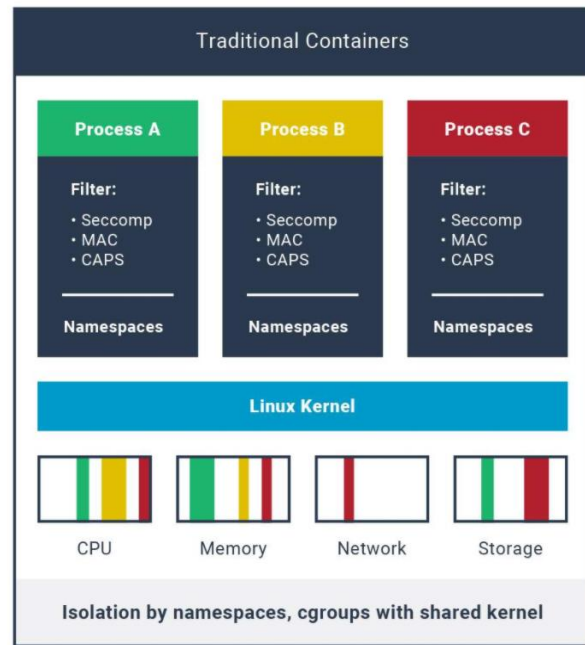
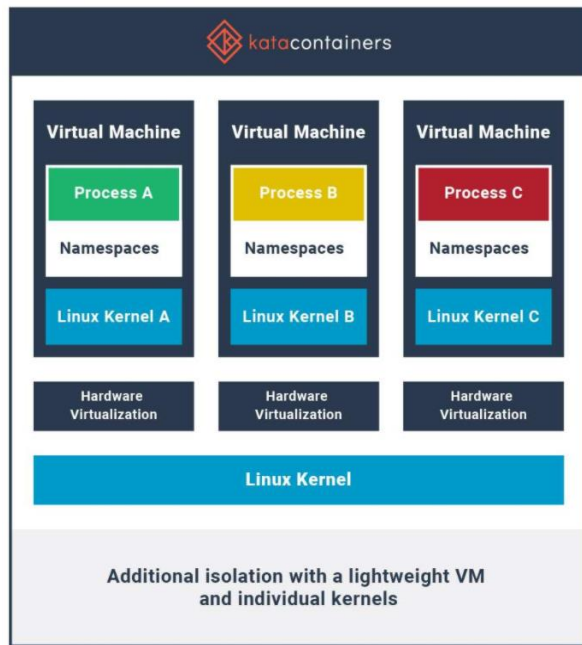
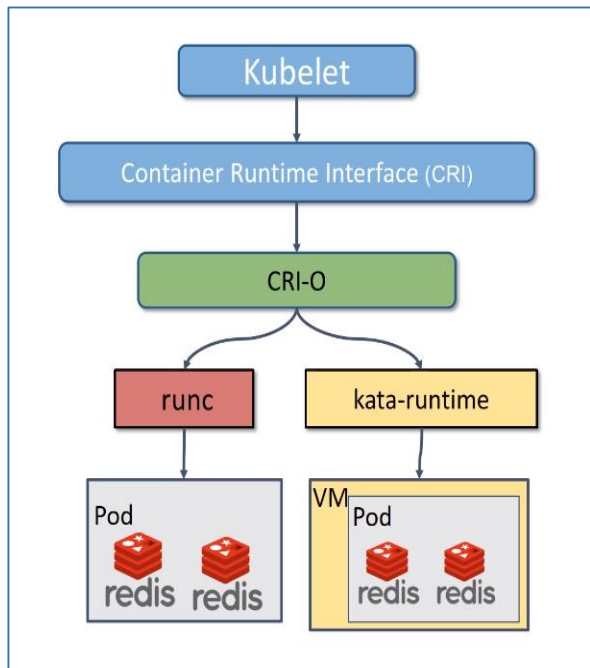
CVE-2019-5736



CVE-2019-14271



基于虚拟机隔离的Kata容器

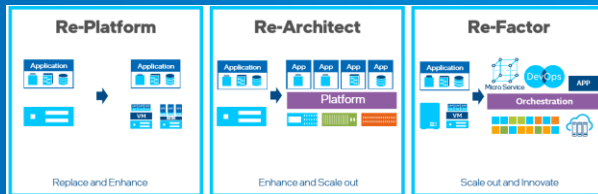


Kata Containers Each container or pod is more isolated in its own lightweight VM

<https://github.com/kata-containers>

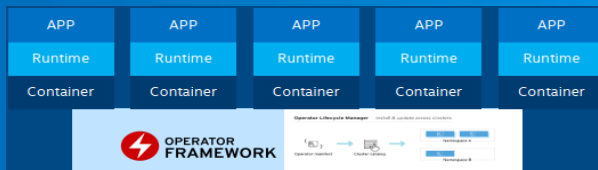
英特尔云原生策略

Transformation



Support and enable ecosystem

Service



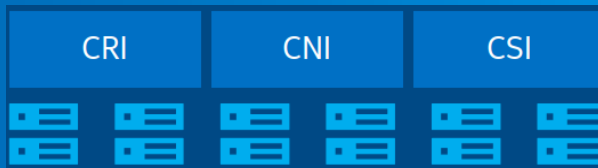
Optimize and accelerate

Platform



Reference stack for different scenario

Infrastructure



Optimize with HW innovation

Intel 优势

UCLLOUD 优刻得 | intel.



Technology Insight



Abundant Cloud
Solutions



Global Use Cases



Vendor Neutral



Broad Ecosystem

68% IMPROVED
HPC FSI
PERFORMANCE

30x

IMPROVED
AI INFERENCE
PERFORMANCE

7.8x IMPROVED
STORAGE
COMPRESSION

2.5x IMPROVED
CLOUD-NATIVE
CONTAINER OPENSLL
PERFORMANCE

Move Faster

Intel® Ethernet



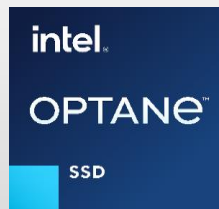
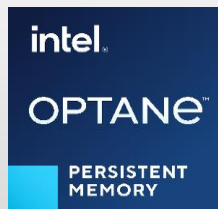
Intel® Silicon Photonics



Intel® Network Switches

BAREFOOT
NETWORKS | an Intel company

Store More



Process Everything



总结

1

云原生是不可阻挡的，它给客户带来价值的同时也带来挑战，这对云合作伙伴来说是机遇。

2

Intel 拥有广泛地产品组合来增强云原生，在云化方面也有丰富地经验。

3

从最简单地步骤开始，制定您的云化战略，与 Intel 合作利用云原生的价值。

THANKS!