



High performance Cloud with Hardware Acceleration

Cloud BU, Huawei

Huawei Cloud Architecture

MarketPlace and Partner

Marketplace API/SDK网站

Industry Solutions

汽车	石油勘探	智能工厂	工业仿真设计	科学计算	生命科学	医疗影像	重疾随访	远程医疗	现代医疗	电力	油气	抄表	全渠道	商贸连锁	电商	园区	物流	智慧家庭	铁路	机场	公路	车联网	金融公共云	保险	BES	物联网	企业云通讯	在线教育	煤炭	渲染	中小企业	游戏
制造				科研		医疗		能源			商业				交通			金融		运营商		其他										

General Purpose Solutions

SAP on Cloud HPC FCS Cloud Office Cloud Communication IoT Dedicated Hosting Cloud DR Web & Mobile Migration Service

Services

Management Services CES ICMS IAM TMS CTS RTS CCS CAS CRS	DevOps ProjectMan CodeCheck CloudPipeline CloudIDE CodeHub TestMan CloudRelease WeLink CloudBuild CloudDeploy MobileTest	IT Services WBS SBS WES LSB DMB RES MBS RBS AMS	Enterprise Workspace IoT IoTPlatform
Application Services DMS FunctionStage SMN DDM ServiceStage XX	Data and AI MRS DPS UQuery CSS Logistics DWS MLS OCR Forms Images Recognition Deblur DIS CDM CloudTable USearch	Communication Meeting CloudIPCC IM VoiceCall CloudPBX MSGSMS	
Computing ECS DeC CCE DeH BMS FGS AS IMS	Storage Services EVS CDN VBS CSBS OBS DSS DES DESS SFS	Network VPC ELB DirectConnect DNS VPN	DB RDS DDS DCS DRS
		Security Anti-DDoS SSA HWAF AAG SIS WTP WAF AAD KMS HIDS SAS HSS ARS WebScan DBSS SCS HVD SCA	

Cloud OS

FusionSphere

Infrastructure

Server Storage Network Security



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The world is changing - more devices, more conns, more data

Billion

Tens of Billions

100 ~ 1000 of Billions



Desktop Internet

Mobile Internet

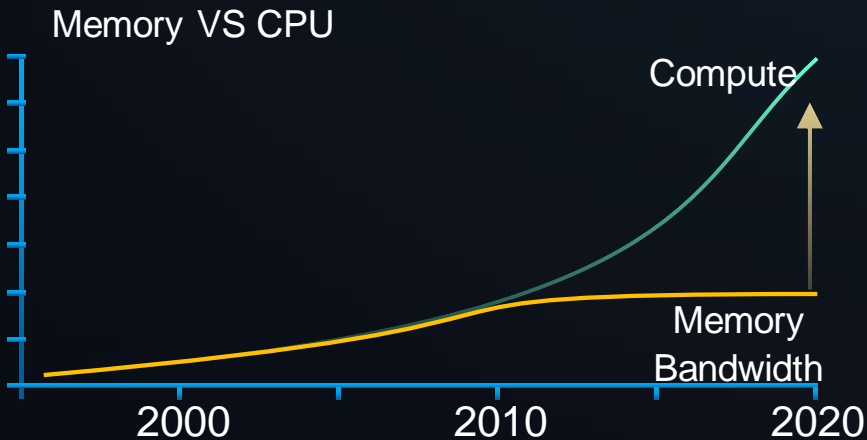
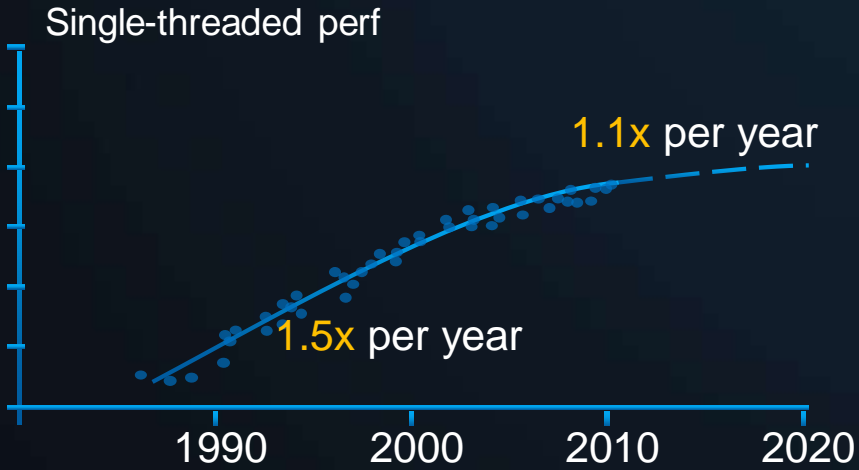
Internet of Things

The PC brought the internet access to billion, during the 1990s

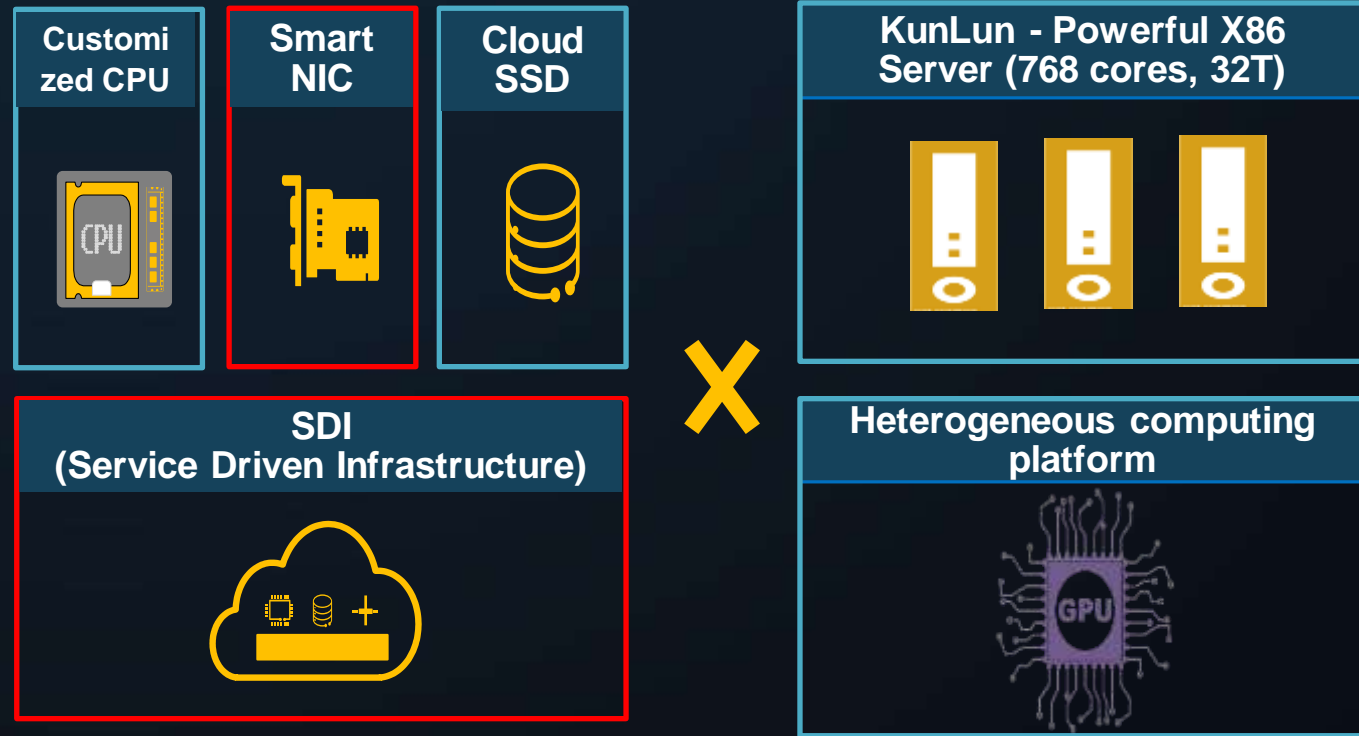
The Mobile Revolution put computing and instant access to information in the hands of billions, in the early 2007s

Now!

Moore's law is slowing



Keeping Moore's law alive in Data Center



Smart NIC

Under the hood: Network Virtualization

Host-based SDN:

separate a centralized control plane from a data plane on the host, and implement almost all virtual networking features, to connect VMs to physical network



vSwitch is most important

History of Huawei eVS

eVS – Elastic Virtual Switch

eVS 1.0

- Start from 2013
- Kernel-based OVS
- Enhanced features (CT/BUM)
- 8Gbps/900Kpps

Limited by Kernel

eVS 2.0

- Start from 2015
- DPDK
- General Packet Filtering Platform
- Optimized SIMD and Multi-threaded scheduling
- 20Gbps/5Mpps

**Limited by CPU frequency,
memory bandwidth**

How to break the bottleneck of vSwitch?

Our way:

Combination of software and self-developed hardware

And additional benefits:

flexibility, high performance, low cost, high availability

eVS 3.0 - First Tens of Millions PPS virtual network switch

40Gbps 10Mpps

**Hardware
Acceleration**

Smart NIC Offloads

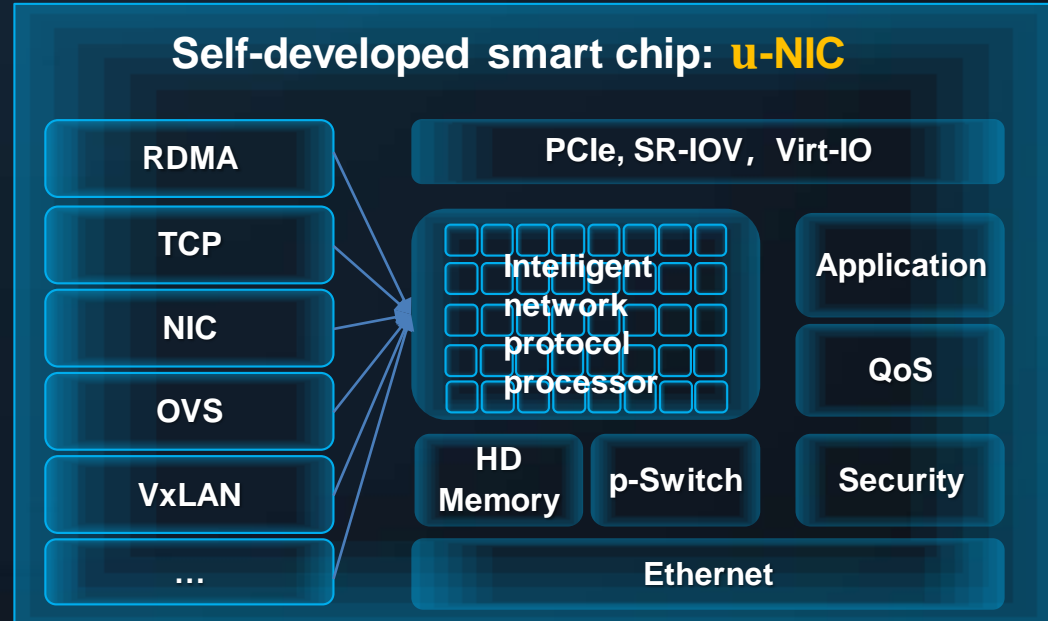
**High
Performance**

Virtio-Direct

**High
Availability**

Hot upgrade

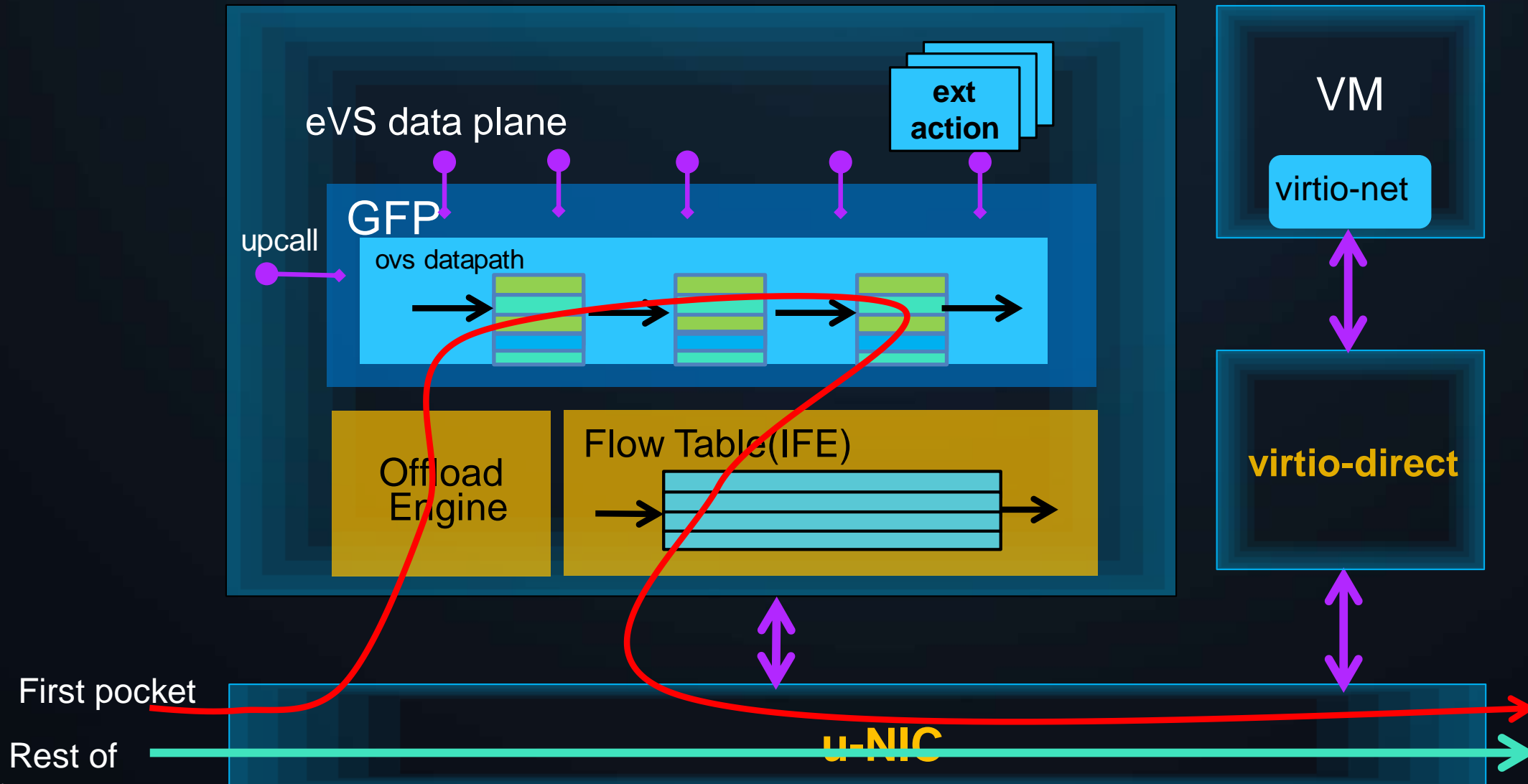
Huawei Smart NIC: u-NIC



Features

- Programmable high performance packet forwarding platform
- Network-specific optimization engine (PPE)
- Large flow table and security rules
- High precision hard QoS

Architecture: Integrated Flow Table and Offload



Virtio-Direct: Virtual I/O

- **High performance virtio data path**

Offload virtio head

Zero Copy

IRQ Aggregation

- **High Availability, Smooth migration**

Standard virtio-net

Non-intrusive GuestOS

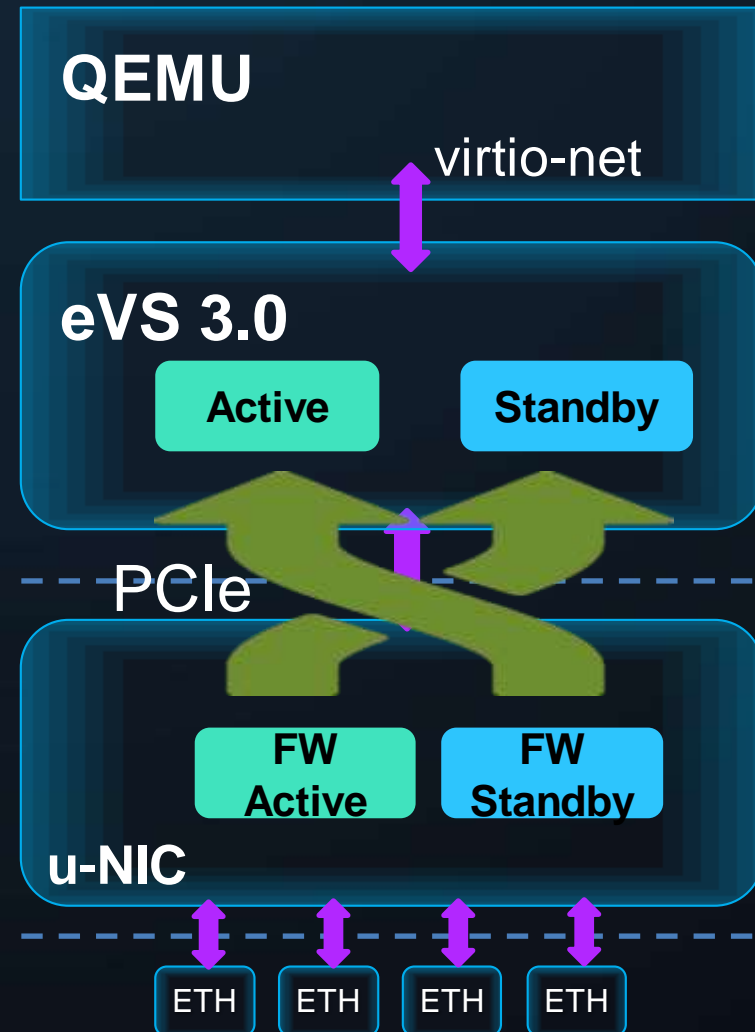
Support Live migration



Hot upgrade, both Hardware and Software

No user impact

Active/Standby Mode
Hot upgrade/downgrade
Independent hot upgrade
Joint hot upgrade



Flexibility, Performance, Availability

	Virtio-Direct	Other Smart NIC SR-IOV
Virtual I/O Mode	Software & Hardware	Hardware
Performance	✓	✓
Non-intrusive GuestOS	✓	✗
Live migration	✓	✗
Hot upgrade	✓	✗

SDI

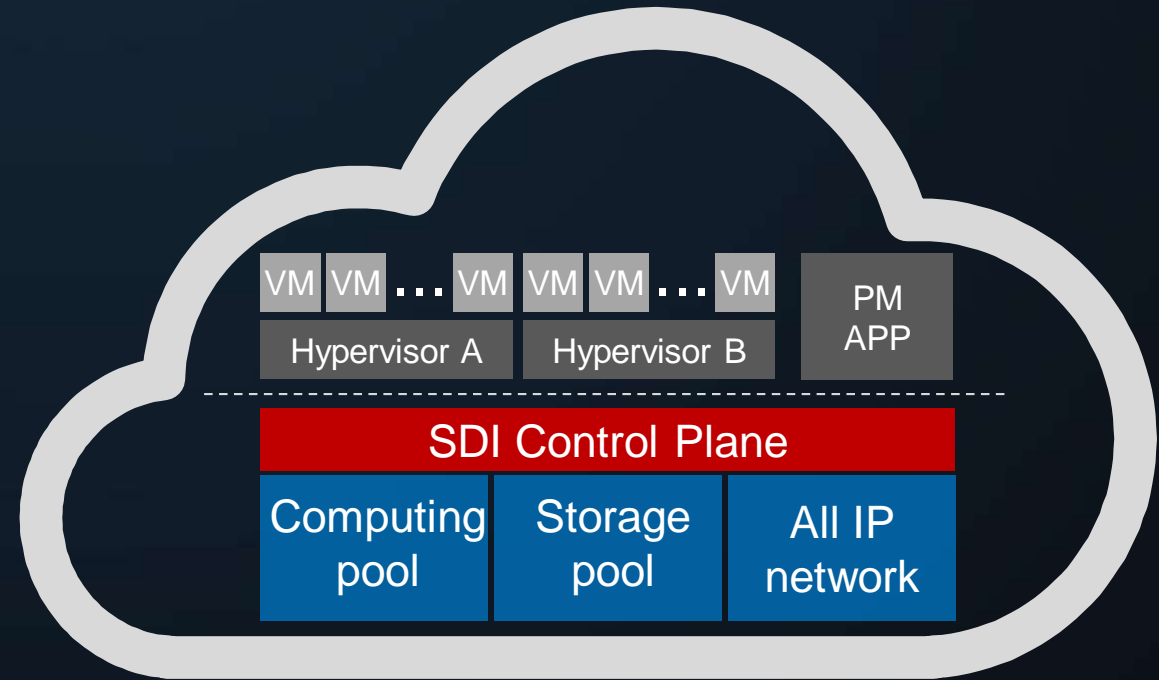


SDI

Release more CPUs to user

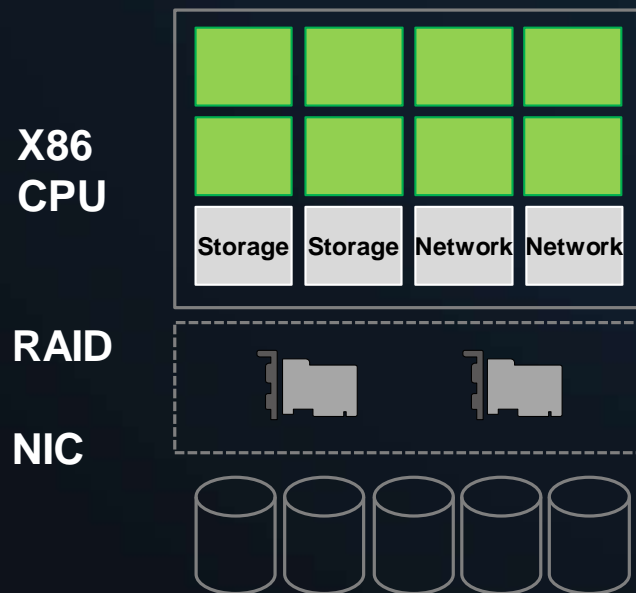
High perf on basic services:
storage and network

Based on self-developed chip

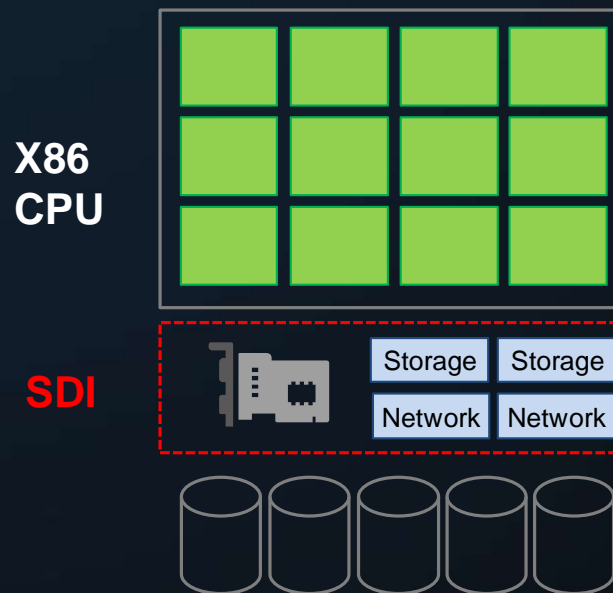


Service **D**riven **I**nfrastructure

SDI

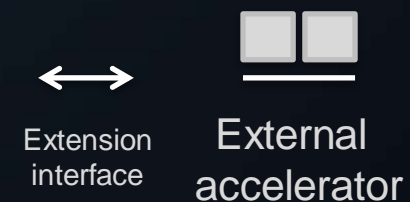
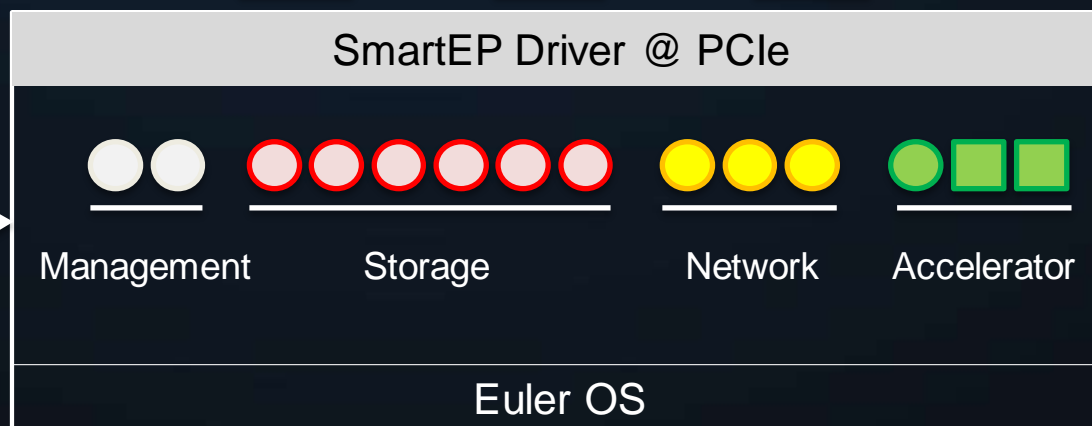
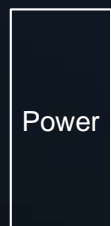
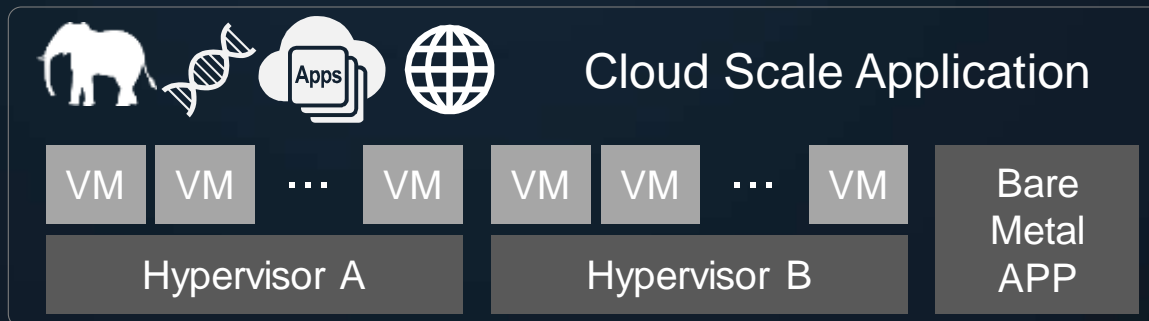
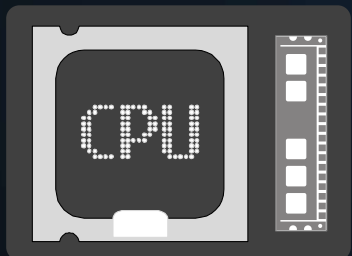


- Resource Competition
- 20+% Cores wasted
- Weak reliability



- Resource isolation
- 100% Cores for users

SDI Architecture



- Software Accelerator
- Hardware Accelerator

Storage Interface

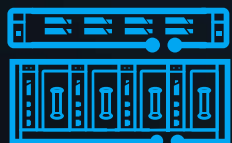
Network Interface

PCIe Interface

Customized CPU



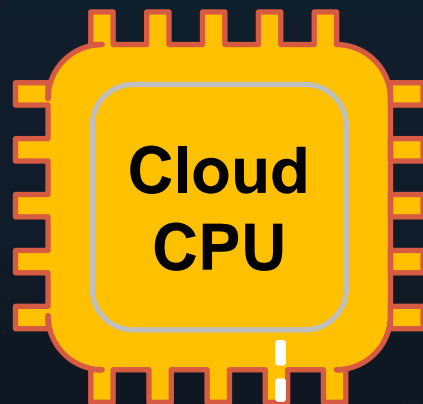
Application



Customized
Server



Data Center



- Single Core Integer **25%^{↑*}**
- Single Core Linpack **70%^{↑*}**
- Memory Bandwidth **62%^{↑*}**

^{↑*}:6151 vs 2680v4

C3ne - with u-NIC, Virtio-Direct, SDI

General Network Enhancement C3ne ECS **NEW**

Latest-generation Intel Xeon SkyLake CPUs and high-speed smart Hi1822 NICs offer powerful and stable computing performance, ultra-high network bandwidth, and high Maximum PPS

Applications:

High Maximum PPS scenarios, such as on-screen video comments and telecom business forwarding
Enterprise-class applications with high network requirements
Small-and medium-sized databases, cache, and search clusters
Data analysis and computing

Specifications:

CPU/Memory ratio	1:2/1:4
vCPUs	2-60
Fundamental frequency/Turbo Boost	3.0/3.4 GHz
Maximum PPS	10,000,000
Maximum intranet bandwidth	40 Gbit/s



Simultaneous online players from 30k to 13M

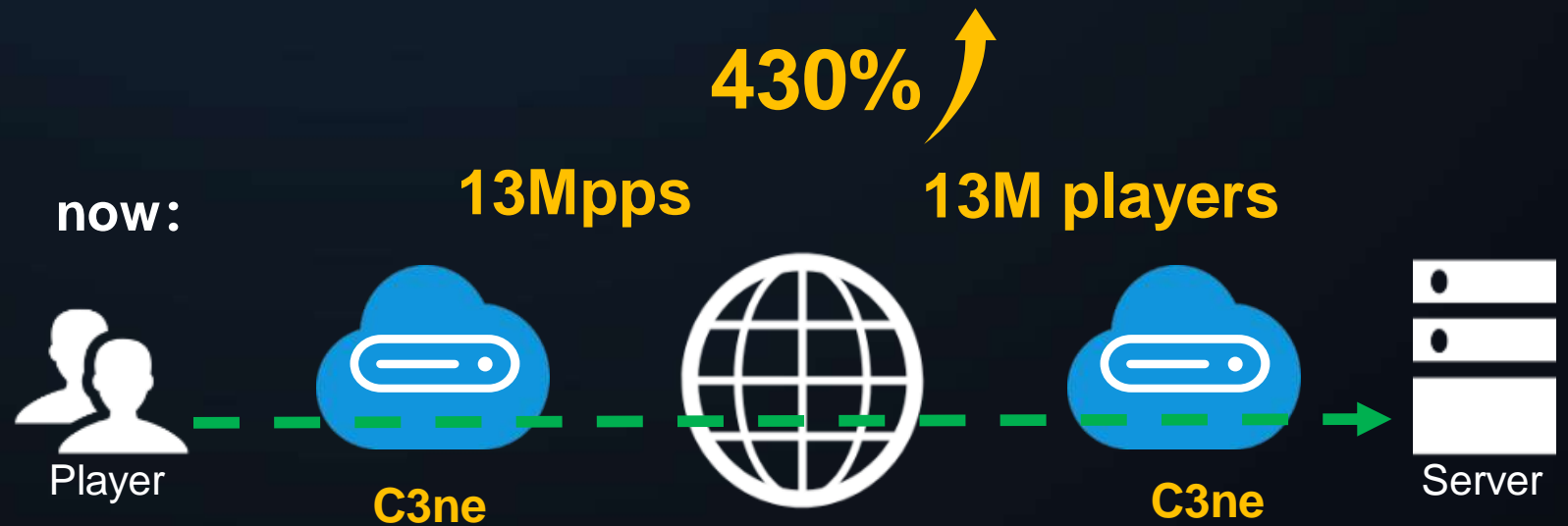


- The first listed company that offers game-accelerating services in the world.
- lower ping, no packet loss, no login failure

Before:



now:





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Thanks



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