**SANGFOR** | **SANGFOR HCI**

# Sangfor Hyper-Converged Infrastructure

The Best Building Block for Your Future-Proof IT

# #1 Security Company in China with Market Capitalization > $9 Billion USD



证券代码
300454

VPN
AD
VDI
NGAF
IAG
HCI
(TOP3)

Asya Pasifik pazarında Gartner raporlarında HCI'da pazar 2.si

# Sangfor Teknoloji Türkiye Ofisi



➢ Ofis yeri: Ataşehir/İstanbul

➢ Çalışan Sayısı: 9 personel (4 satış, 2 presales, 2 post sales, 1 pazarlama)

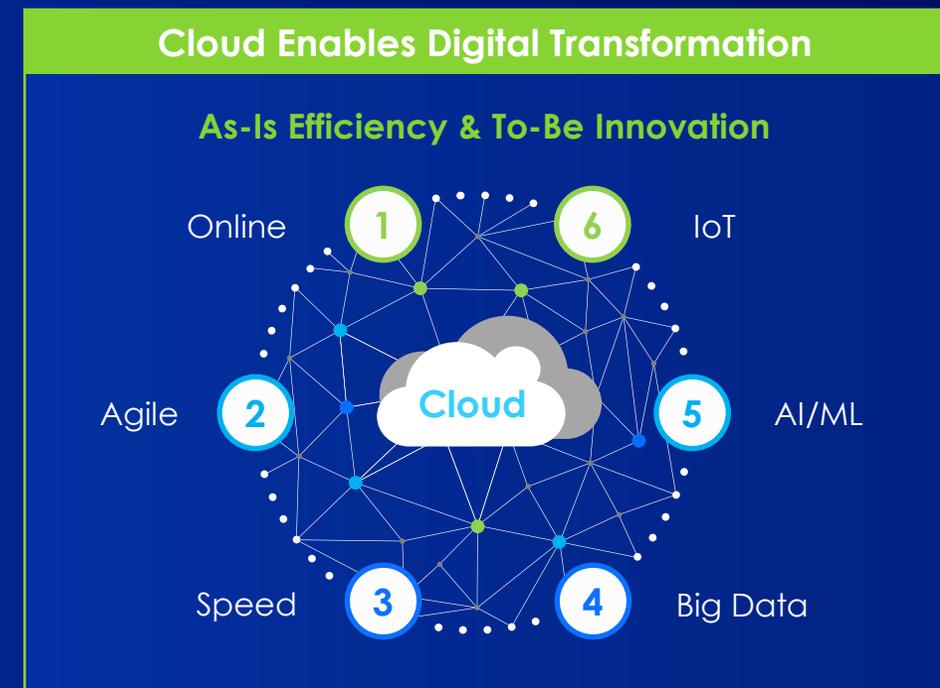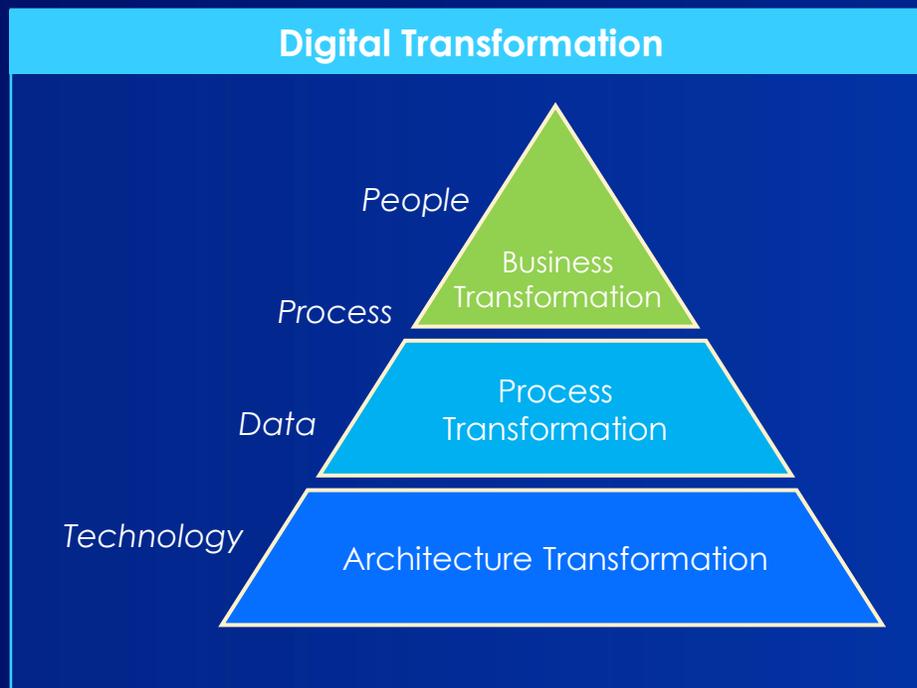➢ Çalışanların bulunduğu lokasyonlar: İstanbul, Ankara

\* Tüm dünyada 60+ ofis ve 9.500+ çalışan

## Türkiye'de ilk SASE PoP noktası kuran üretici

# Digital Transformation in All Industries

**SANGFOR**

**Government**

**E-Government**

- ✓ Smart City
- ✓ Service Government

**Education**

- ✓ MOOC
- ✓ Intelligent Campus
- ✓ E-Backpack

**FSI**

- ✓ E-Money
- ✓ P2P Loan
- ✓ E-Payment

**Medical**

- ✓ Remote Diagnosis
- ✓ Mobile Health Care

**Transportation**

- ✓ Car Networking
- ✓ Pilotless Automobile
- ✓ Car Sharing

**Manufacturing**

- ✓ Industry 4.0
- ✓ IoT

**Retail**

- ✓ O2O
- ✓ Precision Marketing
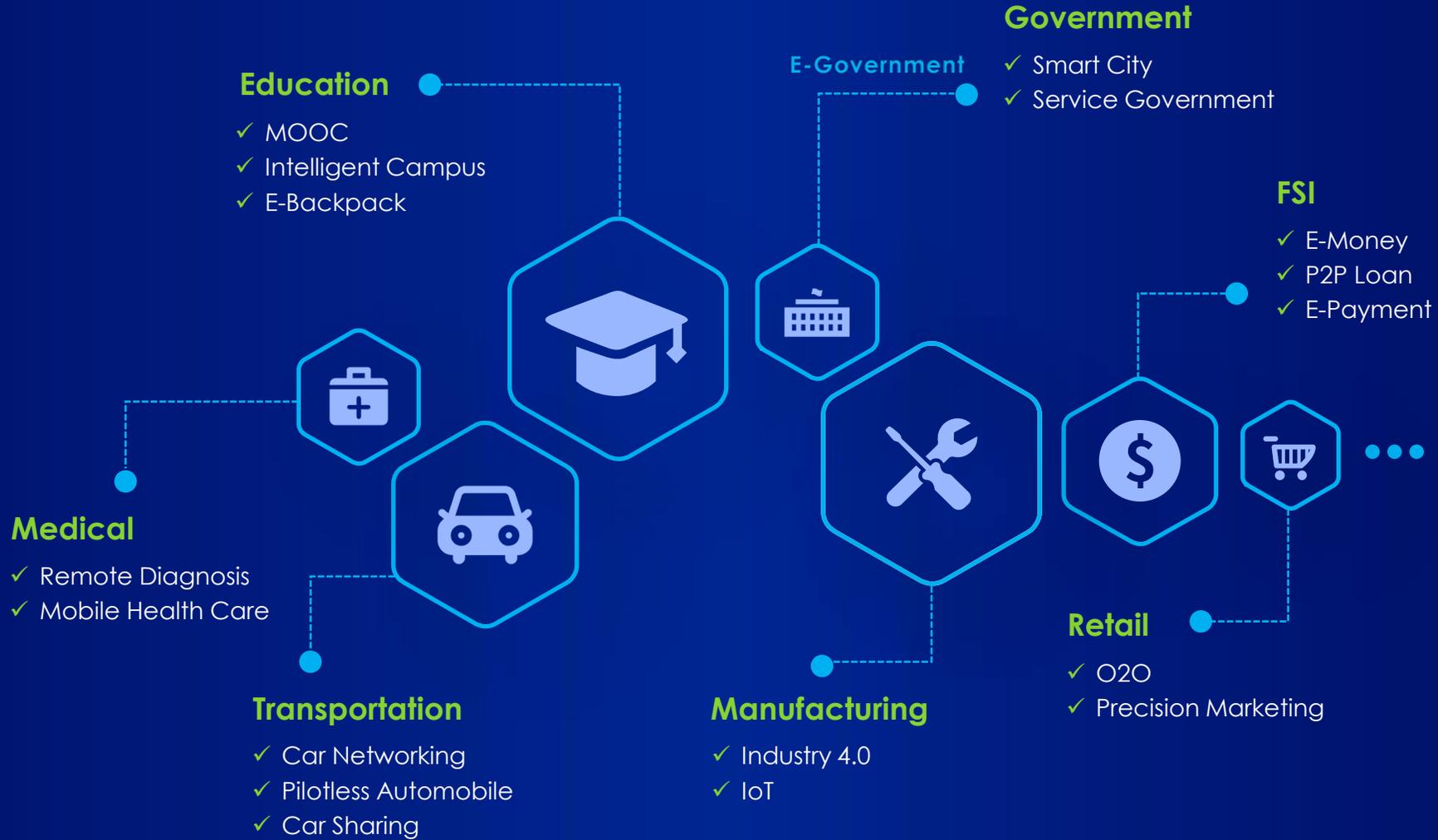
# Cloud Enables Digitalization

➢ 74% of organizations consider digital transformation a top priority, with cloud computing being a key component of these initiatives.

➢ The pandemic has accelerated digital transformation initiatives by an average of 6 years for 97% of companies, with cloud technologies playing a pivotal role in this acceleration.
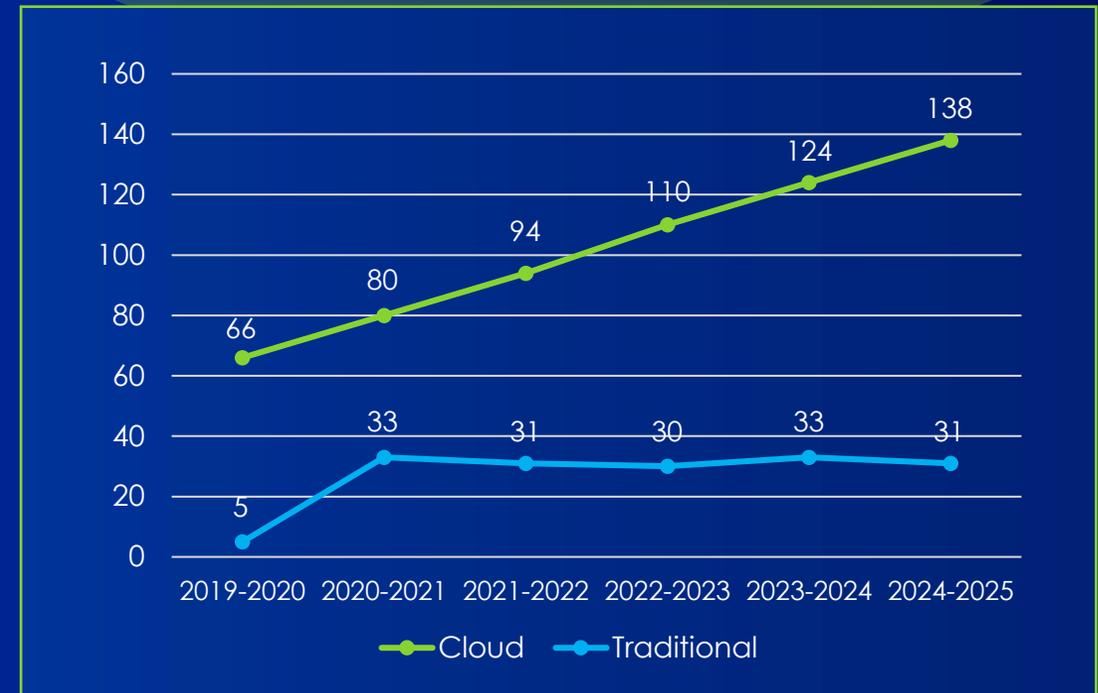


**Digital Transformation**

People

Business Transformation

Process

Process Transformation

Data

Technology

Architecture Transformation

**Cloud Enables Digital Transformation**

**As-Is Efficiency & To-Be Innovation**

Online  1    6  IoT

Agile  2    Cloud    5  AI/ML

Speed  3    4  Big Data

# Enterprise Cloud Strategy Trend: Hybrid Cloud

**SANGFOR**
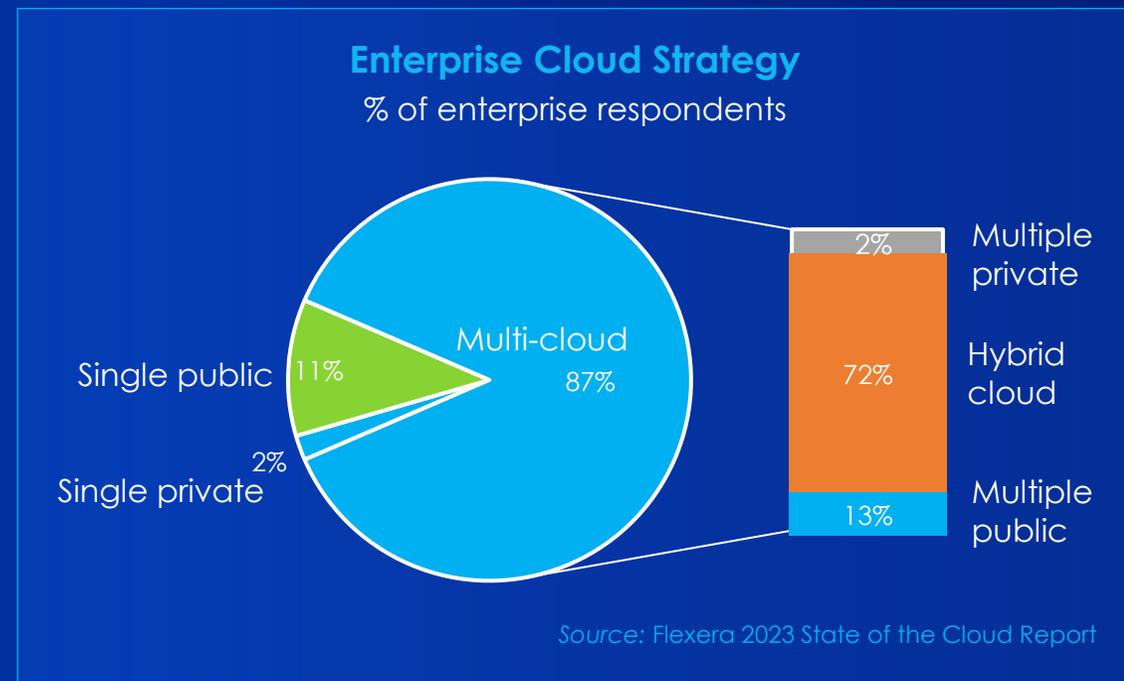
## Enterprise Cloud Strategy

➢ 72% enterprises adopts **Hybrid Cloud** in their Cloud Strategy.

➢ It addresses the **Cloud Adoption Challenges** better compare to other Cloud Strategies.

"Hybrid cloud platforms enable enterprises to select the right infrastructure for the right workload, thereby enabling them to make efficient workload placement decisions that help better meet requirements while controlling cost."
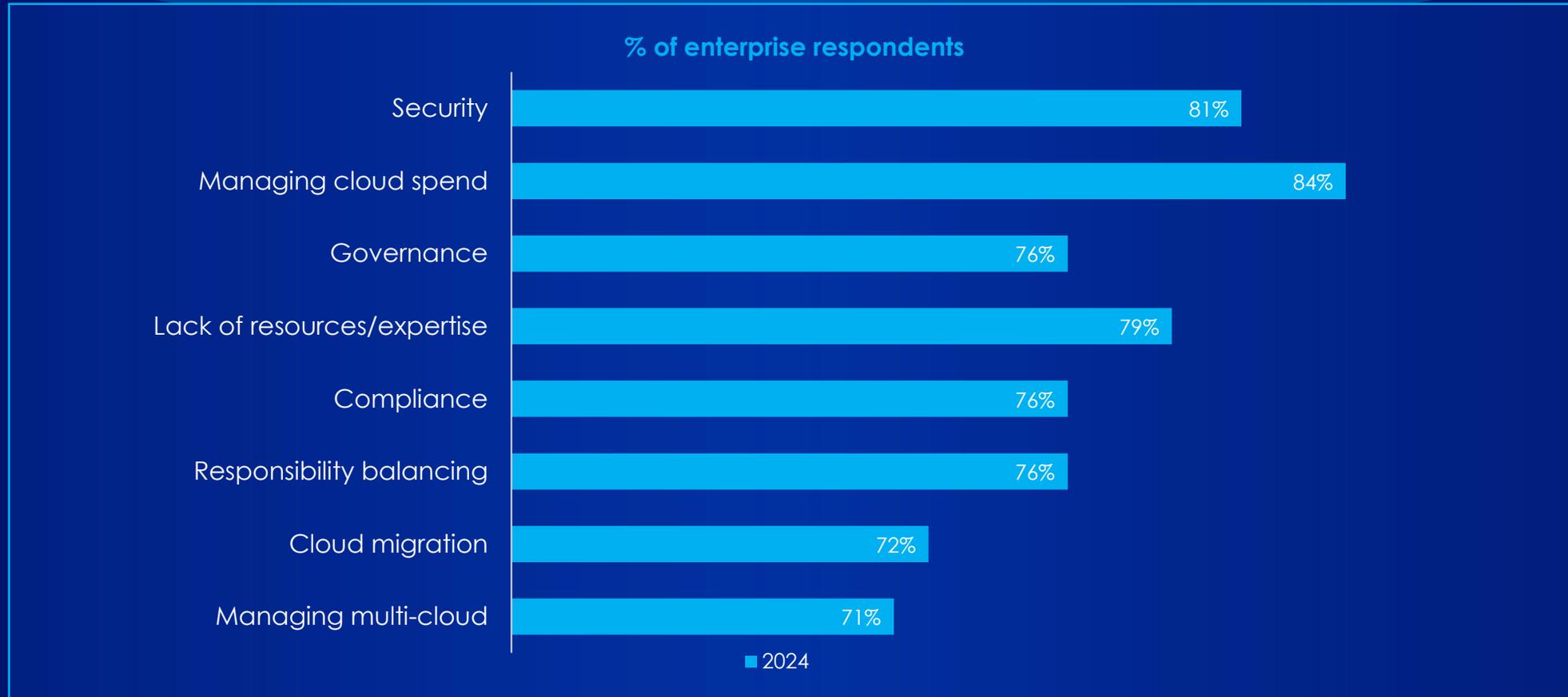
*IDC 2020*

**Enterprise Cloud Strategy**
% of enterprise respondents

Multi-cloud 87%

Single public 11%

Single private 2%

Multiple private 2%

Hybrid cloud 72%

Multiple public 13%

*Source: Flexera 2023 State of the Cloud Report*

# Containerization Is Trending



APPLICATION
CONTAINERIZATION

➤ Containerization allows applications to be easily transported between platforms. Gartner predicts that by 2027, **over 90%** of enterprises worldwide will be running containerized applications in production, and 25% of enterprise applications will be running on containers.

# Cloud Adoptions Challenges

## Top Enterprise Cloud Challenges YoY

**% of enterprise respondents**

| Challenge | % |
|---|---|
| Security | 81% |
| Managing cloud spend | 84% |
| Governance | 76% |
| Lack of resources/expertise | 79% |
| Compliance | 76% |
| Responsibility balancing | 76% |
| Cloud migration | 72% |
| Managing multi-cloud | 71% |

■ 2024

*Source: Flexera 2024 State of the Cloud Report*

# Sangfor Offerings: Transform Your Cloud Journey

| Cloud Stacks Domain | On-Prem HCI-SDDC | On-Prem Private Cloud | Sangfor Hybrid Cloud | Off-Prem Managed Cloud Services (MCS) |
|---|---|---|---|---|
| Consultancy | | | Lightweight Consultancy (FREE) | |
| Management | HCI SDDC (FREE) | Sangfor Cloud Platform(SCP) | SCP (manage both Private Cloud & MCS) | Sangfor Cloud Center (SCC) |
| Backup/ DR | | aSC (Active-Active) | | Managed Backup/ DR Services |
| | | CDP | | |
| | aDR/ hDR (Active/Standby DR) | aDR/ hDR | | BaaS/ DRaaS |
| Security | | *Cyber-Guardians SOC Services | | Managed Security Services |
| | aSEC (vSecurity) | aSEC | | SECaaS |
| HCI Infrastructure | aNET (vNetwork) | aNET | | KubeMgr Container |
| | aSAN (vStorage) | aSAN | Nano Cloud (ROBO appliance) | IaaS (Shared/ Dedicated) |
| | aSV (vCompute) | aSV | | |
| | aServer/ 3rd-Party | aServer/ 3rd-Party | | |
| | aDesktop (VDI) | Ent Dist Storage (EDS) | SD-WAN | SkyOps |

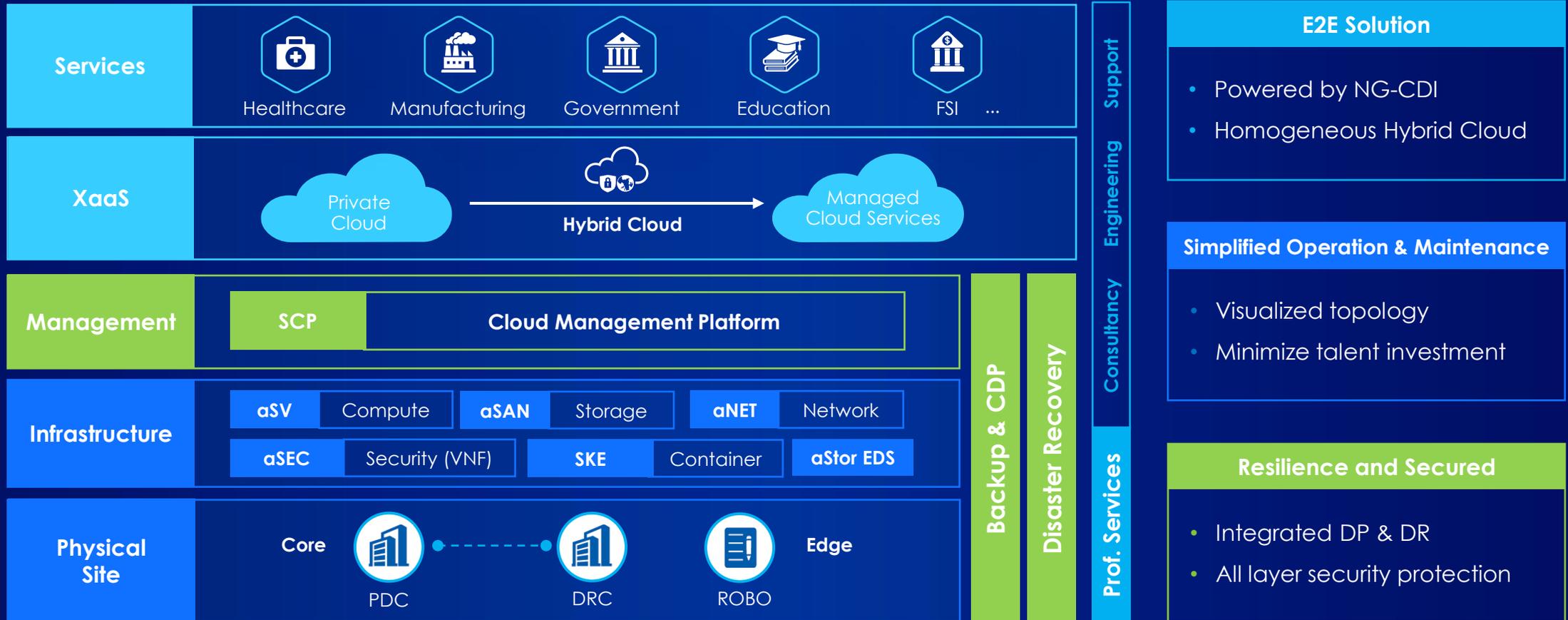| Legacy Physical | Virtualization | Private Cloud | Hybrid Cloud | Multi-Cloud |
|---|---|---|---|---|

**Cloud Evolution**

Remarks: Cloud Evolution & Cloud Stacks design variance by actual business case. *Cyber-Guardians SOC Services only available in Malaysia now.
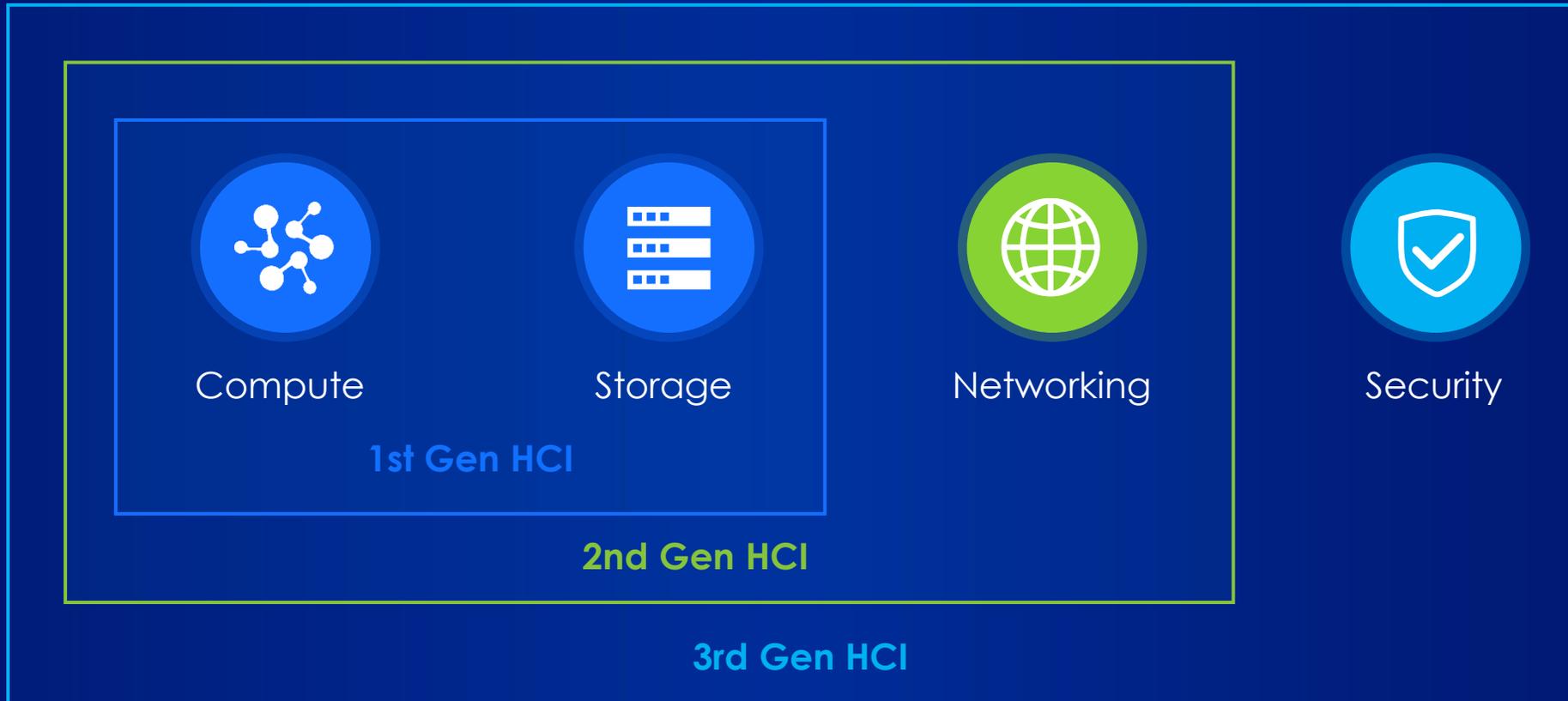
# Sangfor Cloud Solution Overview

➤ Simplified, Secured and Value Optimized.

| Services | Healthcare | Manufacturing | Government | Education | FSI | ... |

**XaaS**
Private Cloud → Hybrid Cloud → Managed Cloud Services

**Management**
| SCP | Cloud Management Platform |

**Infrastructure**
| aSV | Compute | aSAN | Storage | aNET | Network |
| aSEC | Security (VNF) | SKE | Container | aStor EDS |

**Physical Site**
Core — PDC ···· DRC — ROBO — Edge

Backup & CDP

Disaster Recovery

Support · Engineering · Consultancy · Prof. Services

## E2E Solution
- Powered by NG-CDI
- Homogeneous Hybrid Cloud

## Simplified Operation & Maintenance
- Visualized topology
- Minimize talent investment

## Resilience and Secured
- Integrated DP & DR
- All layer security protection

# Based on 3rd Gen HCI with Full Convergence

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Compute

Storage

Networking

Security

**1st Gen HCI**

**2nd Gen HCI**

**3rd Gen HCI**

Sangfor HCI offers a one-stop software-defined infrastructure that enables customers to smoothly transition to a unified cloud that is ultra-simplified, highly performing, comprehensively secured and extremely resilient.
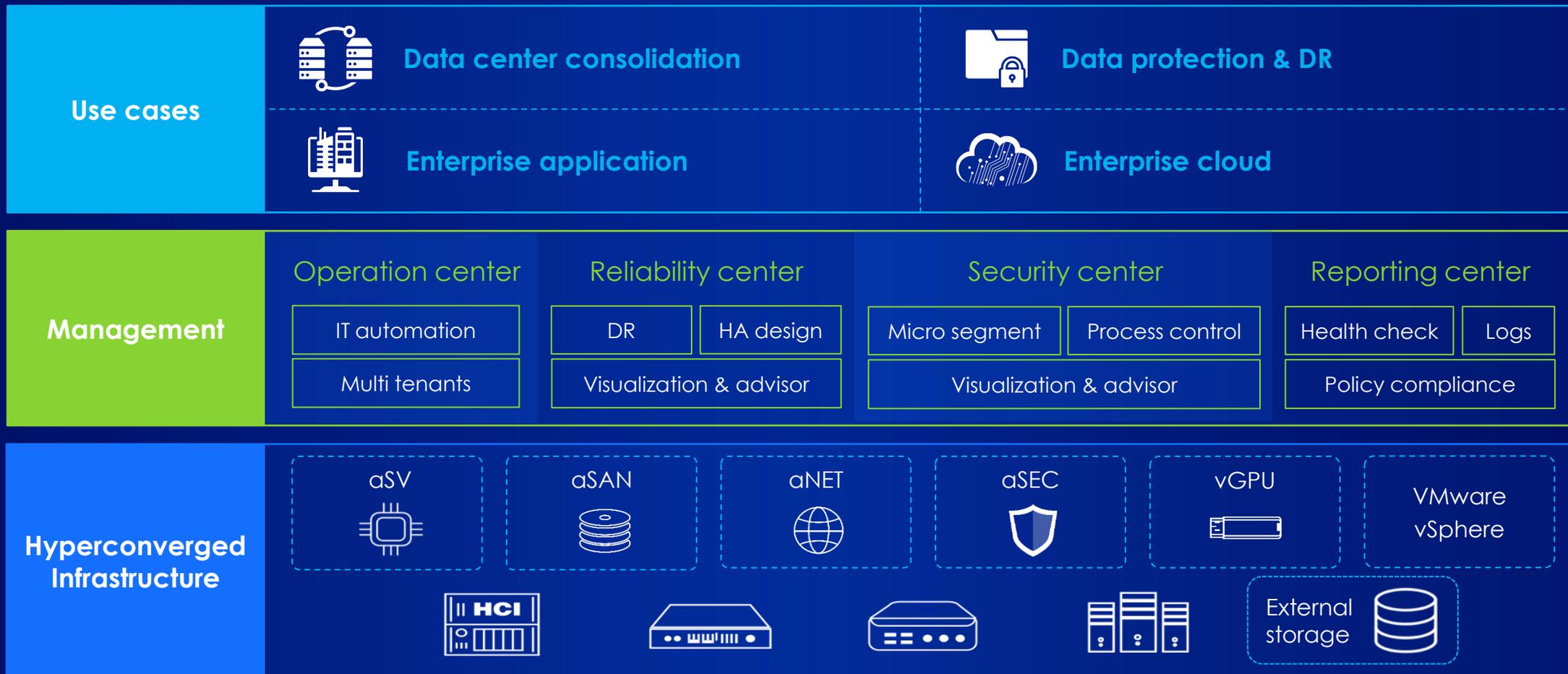
# Sangfor HCI Solution Framework



**Use cases**

- Data center consolidation
- Data protection & DR
- Enterprise application
- Enterprise cloud

**Management**

| Operation center | Reliability center | | Security center | | Reporting center | |
|---|---|---|---|---|---|---|
| IT automation | DR | HA design | Micro segment | Process control | Health check | Logs |
| Multi tenants | Visualization & advisor | | Visualization & advisor | | Policy compliance | |

**Hyperconverged Infrastructure**

| aSV | aSAN | aNET | aSEC | vGPU | VMware vSphere |
|---|---|---|---|---|---|

External storage

# Key Business Requirements for IT Infrastructure

**Simplified**

**Stable**

**Secure**

**High Performance**

# Simplified
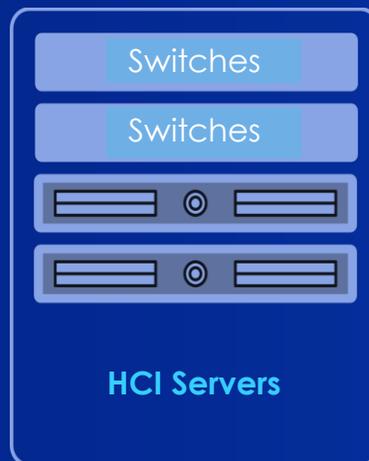
# Sangfor HCI is Consolidating 3-tier IT



Sangfor HCI-built DC
Traditional DC

- Switch/Router
- Security
- Server
- Management
- FC
- Storage

aSV — Compute
aSAN — Storage
aNet — Network
aSEC — Security
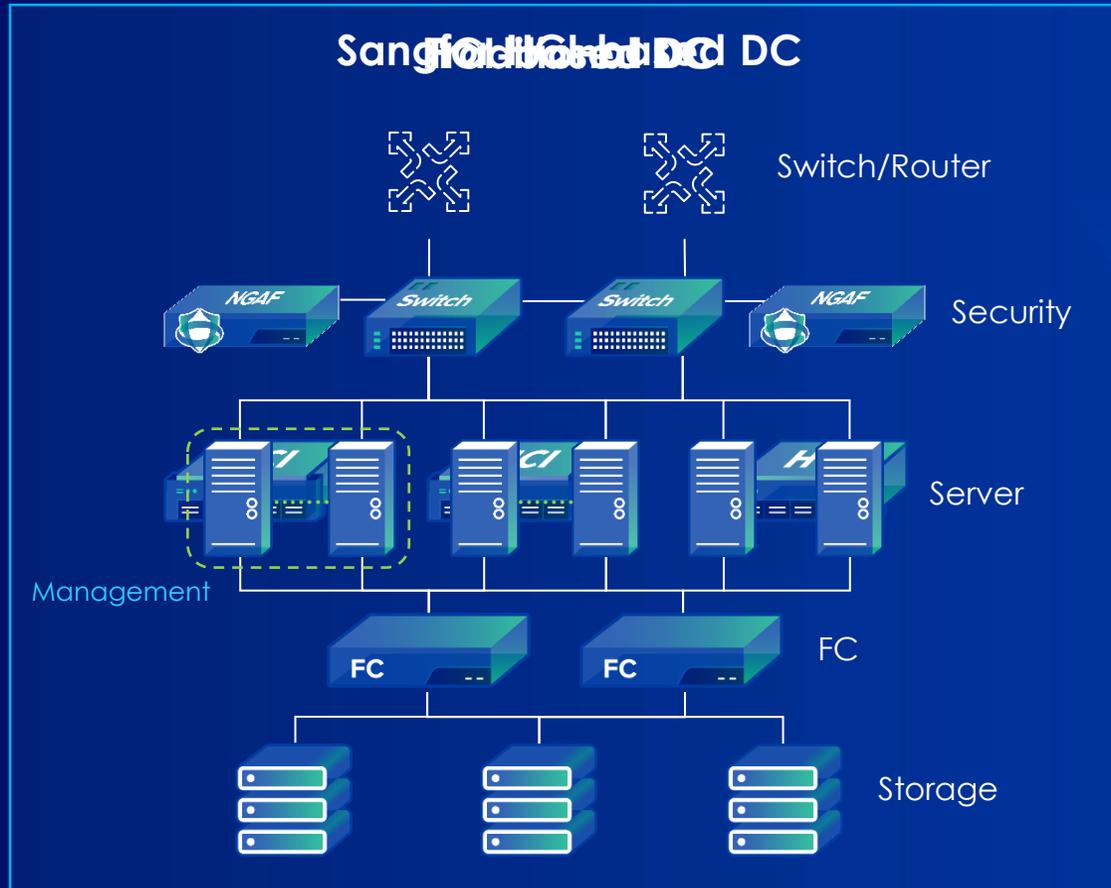
# Data Center at Your Fingertip

# Easy Scale-out
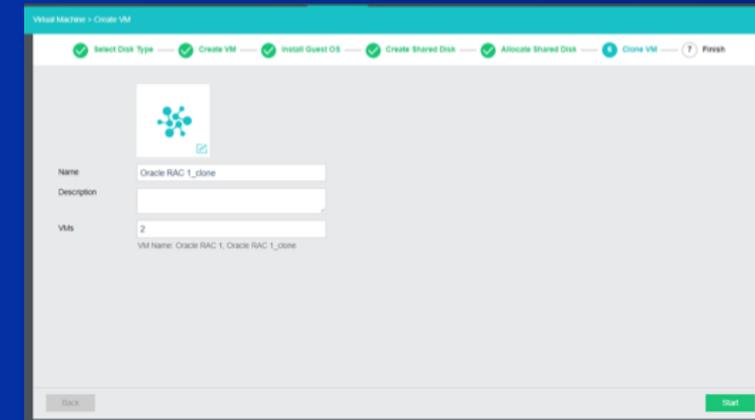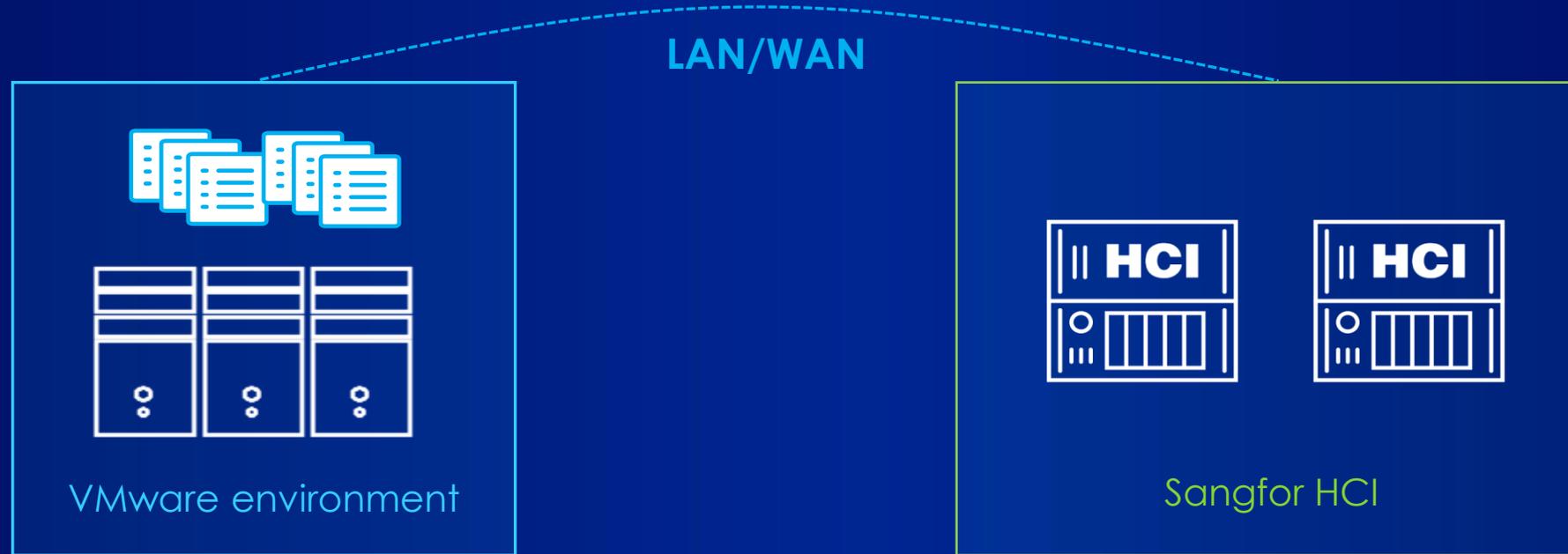


😞 Pre-investment 3-5 years in advance

😞 Data migration for expansion

😞 Performance bottle neck

🙂 Start with only 2 nodes

🙂 Expansion without down time

🙂 No capacity limitation

# Specific Design for Critical Apps

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6 steps to launch Oracle RAC cluster

# Built-in VMware Management & Backup

**LAN/WAN**

VMware environment

Sangfor HCI

🙂 Built-in VMware lifecycle management

🙂 Bi-directional migration

🙂 Built-in backup from VMware to Sangfor & instant recovery

🙂 VMware vSphere 7.0 Support
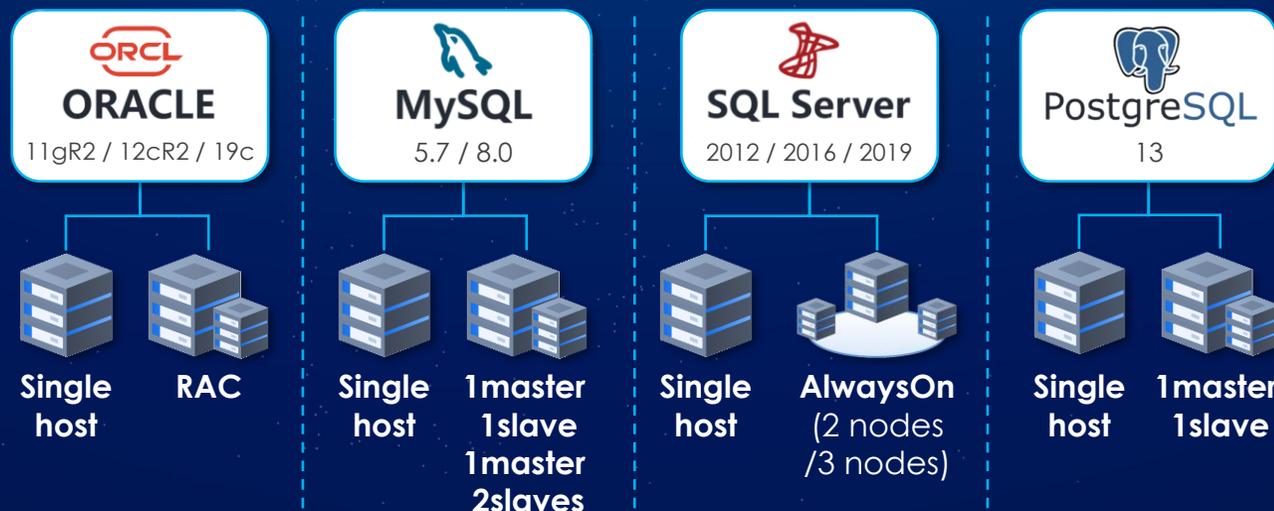
# GPU Resource Visualization
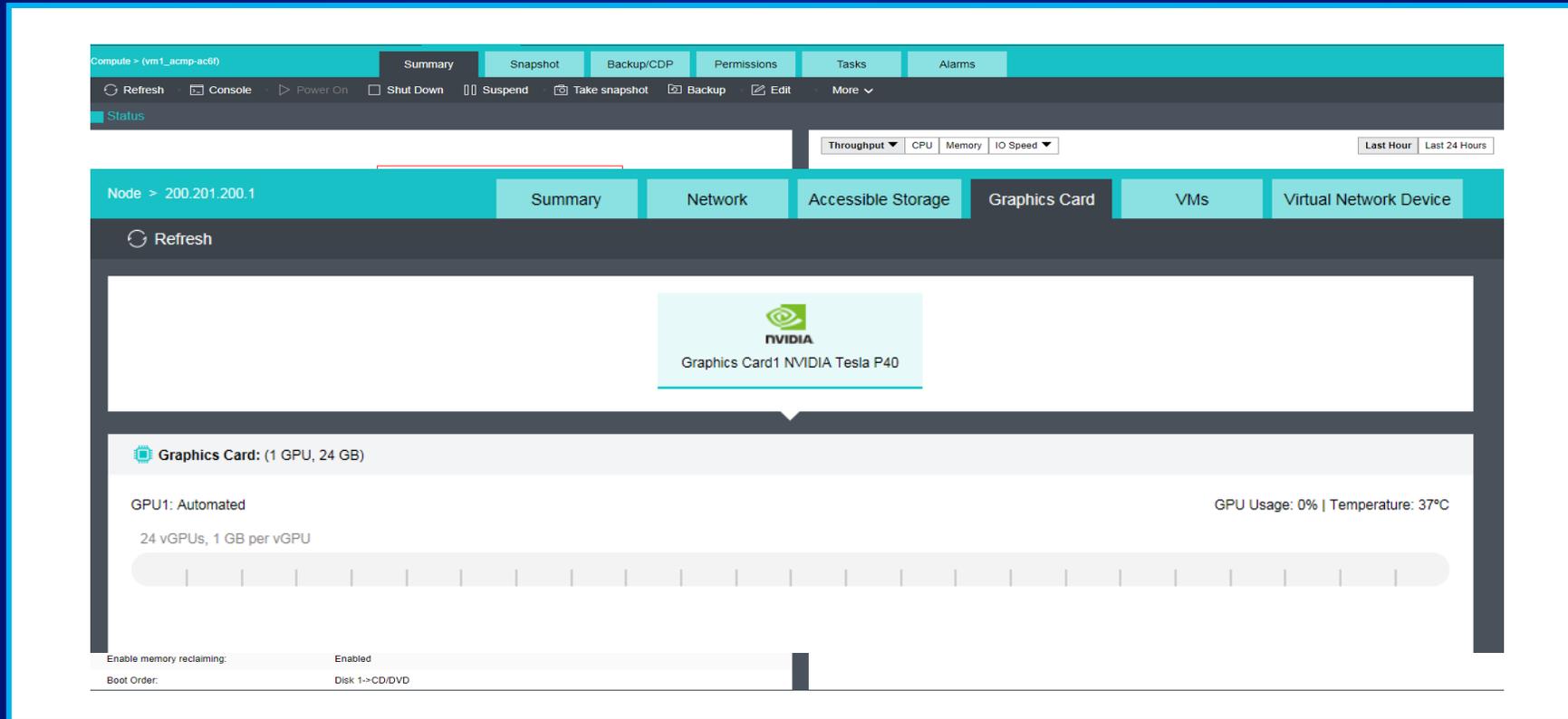


1. Visualized management for GPU, demonstrating GPU utilization in real-time
2. Dynamic display of current GPU's resource assignment to optimize distribution and utilization

# Easy Database Management

*DMP is deployed on SCP and supported on version 6.10.0 and later only.*
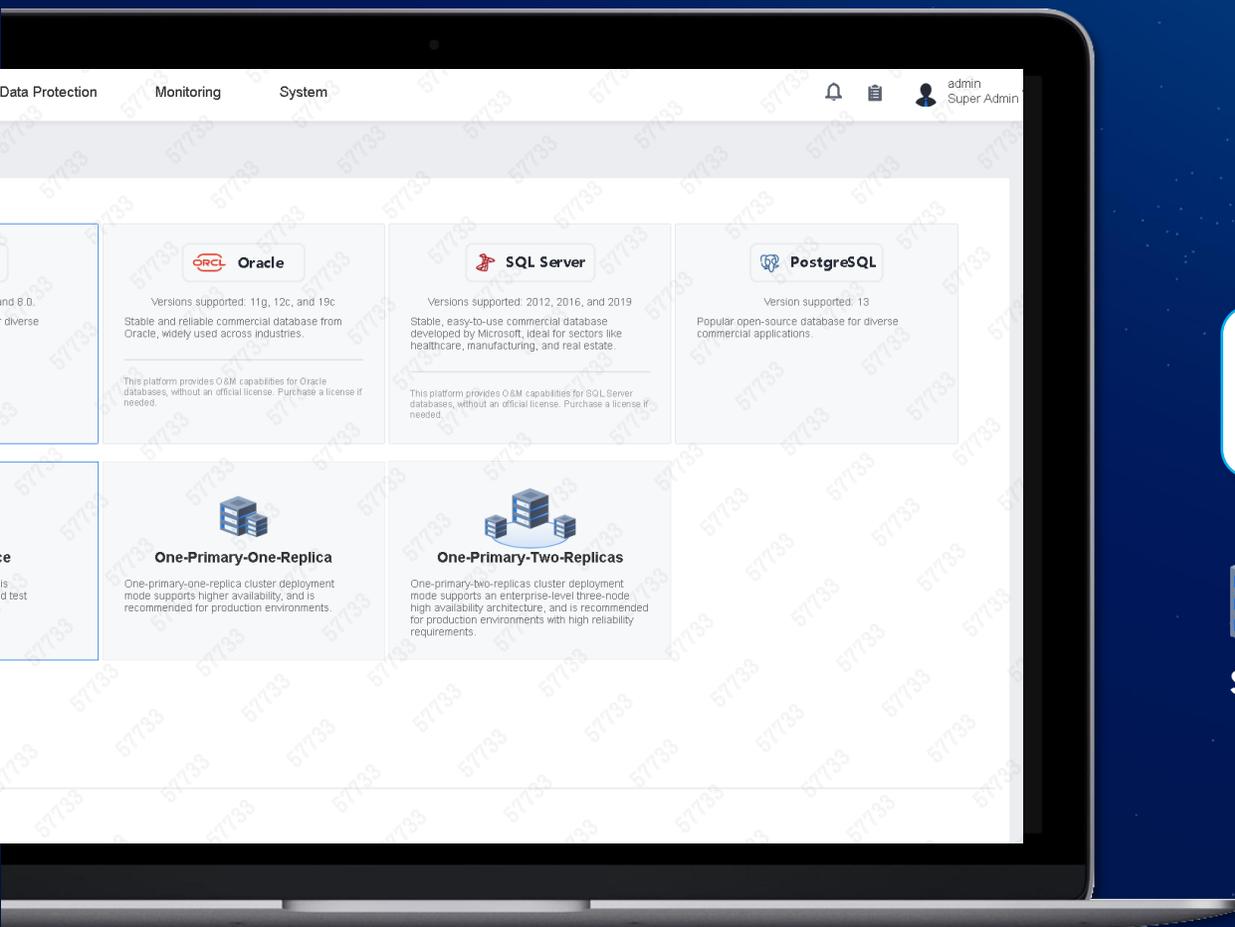
*You can **create new database** instances as well as **manage existing databases** with Sangfor DMP.*



| ORCL ORACLE | MySQL | SQL Server | PostgreSQL |
|---|---|---|---|
| 11gR2 / 12cR2 / 19c | 5.7 / 8.0 | 2012 / 2016 / 2019 | 13 |

| Single host | RAC | Single host | 1master 1slave 1master 2slaves | Single host | AlwaysOn (2 nodes /3 nodes) | Single host | 1master 1slave |

# Unified Platform for Both VM and Container

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**Cloud-native** | MES | E-com. | Internet | **Traditional** | Oracle | MySQL | OA

## SCP

### SKE Management

**VM Mgmt.**

#### Kubernetes Cluster

CNI

CSI

| Pod | Pod | Pod |

| Master | Worker |

| VM | VM |

#### Kubernetes Cluster

| Pod | Pod | Pod |

| Master | Worker |

| VM | VM |

VM

VM

## HCI

aSAN     aSV     aNET

**Upgrade HCI and SCP to run SKE**

**SKE is based on HCI, delivered with appliance or software-only**
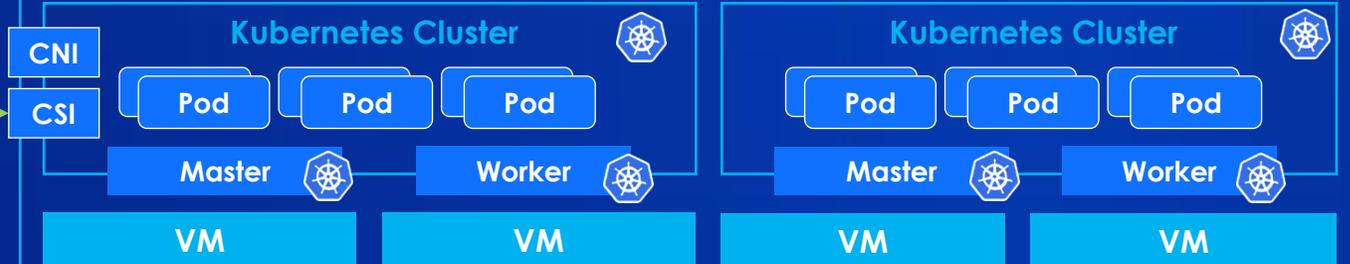
**Easy to Use**

**Highly Reliable**

**Unified Mgmt.**

# More Simplified in Management

## HCI + VDI

SCP unified management

VDC

Business VMs

HCI cluster

## CLI support



## Dual language support

# Unified Management for Physical, AWS and HCI



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## Tenant 1
| Server | VM | VM |
|---|---|---|
| Physical | | amazon webservices™ |

## Tenant 2
| Server | VM | VM |
|---|---|---|
| Physical | | amazon webservices™ |

**User**

**SANGFOR CLOUD**

| HCI | Physical | AWS |
|---|---|---|

**Unified mgmt. for hybrid cloud and multi-cloud:**

- Consistent IaaS user experience between physical, private cloud and public cloud.

- Each tenant can only see and manage its own cloud resource, simplified O&M with guaranteed isolation

# Stable

# Multi Copies & Built-in Backup
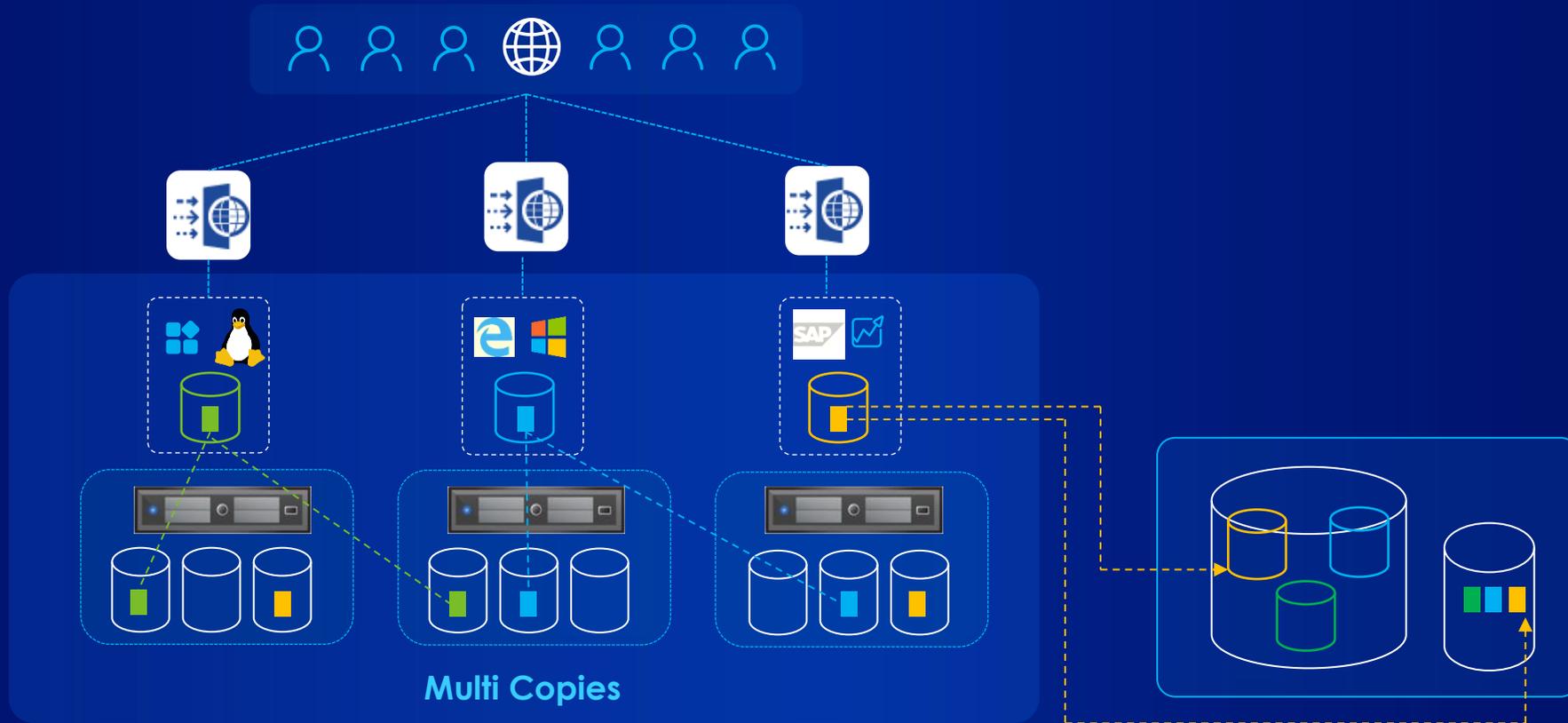


**Multi Copies**

🙁 Single point of failure

🙁 Additional backup software required

🙂 Inherent multi copies design

🙂 Built-in backup feature with RPO=1 hour

# CDP: Data Time Machine



☺ Built-in advanced data back up

☺ RPO≈0. RTO≤5 Min

# DRS 2.0: Proactively Intelligent

- Dynamic Resource Scheduling (DRS) is a technology used for balancing and scheduling cluster resources. By monitoring the resource usage of each host, DRS promptly migrates VMs to avoid resource hotspots or uneven loads, ensuring business continuity.

## DRS 1.0: Load balancing of hosts is paramount

| Unable to predict in advance | Host-based | Resource-based |
|---|---|---|
| Triggered on thresholds; no forecasting or recommendations | Does not take VM workloads into account | Does not consider the performance and reliability impact after scheduling |

**Usage over 70% Load gap over 30%** → **Live migration Running location** → **Low-load host**

CPU/RAM over threshold → Triggered Execution → Migrate

## DRS 2.0

- **Load balanced**
- **High reliability**
- **Minimal impact**
- **No performance degradation**



**VM Scoring**

**Performance score is calculated every 10 mins**

**Host Scoring**

**Performance score is calculated every 10 mins**

**Health score is calculated every 30 mins**

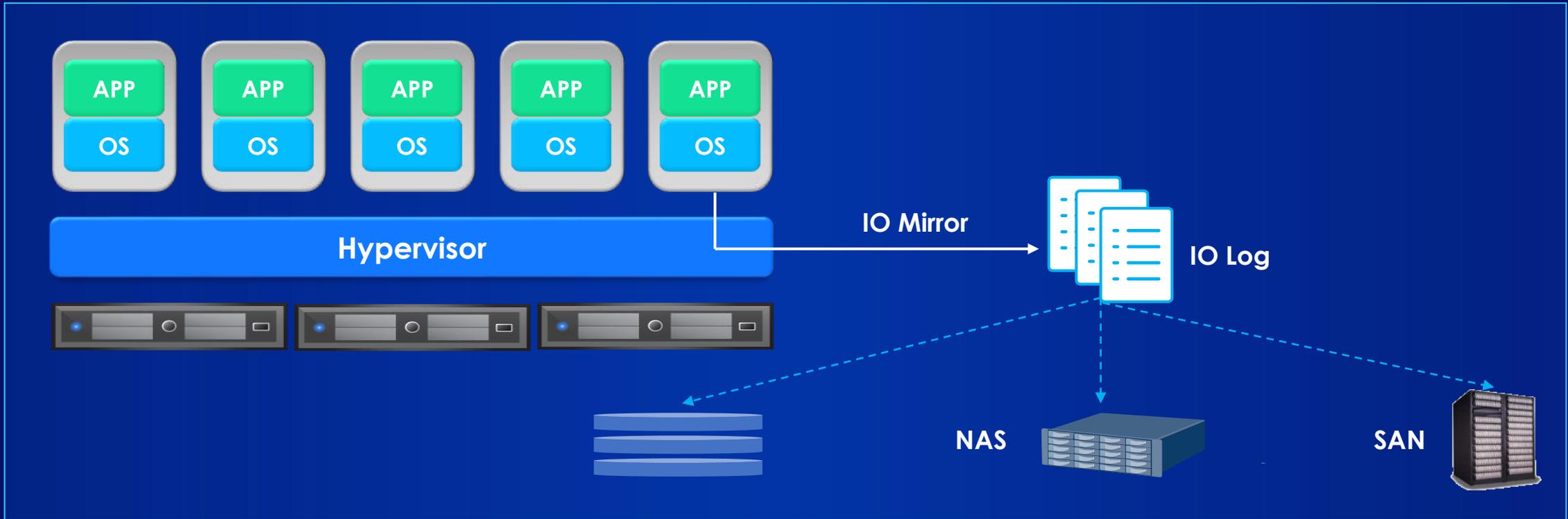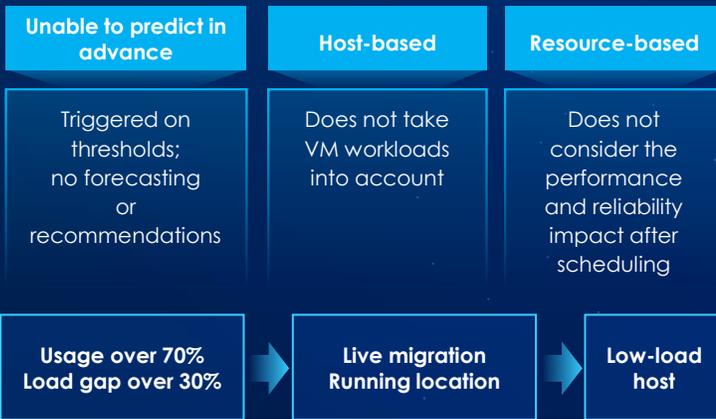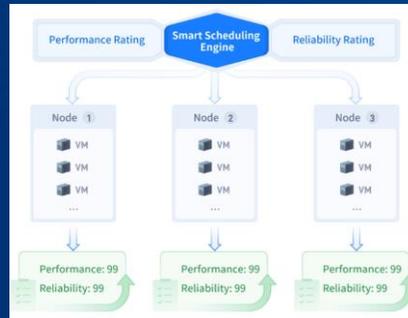**Intelligent scheduling can be applied to either on-premises or cloud-based hosts based on the historical resource data from the past 5 days and the estimated future load for the next 2 hours.**
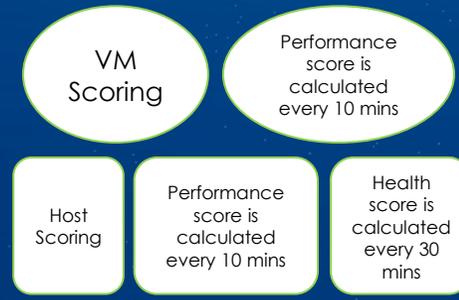
**To optimize DRS effectiveness and ensure business continuity, scheduling considers scores from two dimensions: hosts and VMs.**

### Performance & Reliability Scoring Parameters (Partial)

| Factor | Parameter |
|---|---|
| CPU | CPU actual usage/expected usage, logical cores |
| RAM | Actual RAM usage, swap partition size, CE qty., CE storm, UE error |
| Network | Packet loss/error rate |
| Storage | Replica location, disk usage |
| RAID | RAID card reset/backplane and SAS cable alert |
| Disk | HDD bad sectors/irreparable sectors, SSD life |
| Disk | Disk overheat, failure alert |

**A comprehensive scoring system based on detailed metrics ensures that business reliability remains high and performance improves after migration.**

**Intelligent Live Migration**

# HA 2.0: Proactive Reliability

➢ HA (High Availability) is an effective solution for ensuring business continuity in virtualized clusters. It aims to minimize the impact on business operations when system software or hardware failures occur.

## HA 1.0

### Bottom-line function to ensure business continuity when failure occurs

| Passive Response | Limited Scope | No Detection |
|---|---|---|
| It primarily focuses on handling failures when they arise and is unable to address potential risks. | Only considers data and resources. However, failure could occur due to extreme scenarios. | Lack of monitoring and assurance of HA conditions. |

**Failure Detection**
- Server power outage
- Motherboard component failure
- Storage service failure
- Business network failure

**Response Mechanism**
- Kills the process on the source end
- VM restarts on a new host

**Target Host**
- Replica available
- Sufficient CPU resources
- Remaining configurable memory is greater than the VM

## HA 2.0

✓ More comprehensive detection dimensions
✓ More proactive response actions
✓ More intelligent scheduling methods
✓ More visualized operation and maintenance records

| Anomaly | Impact | Response |
|---|---|---|
| Low CPU microcode version | Host is at risk of failure | Intelligent live migration |
| Persistent CPU overheating | Host is at risk of failure | Intelligent live migration |
| Memory ECC errors | Available memory resource decrease | Intelligent live migration |
| OS disk lifespan ends | May lead to host going offline | Intelligent live migration |
| Only 1 power module remaining | May lead to host going offline | Intelligent live migration |
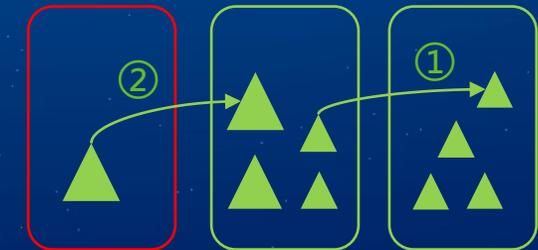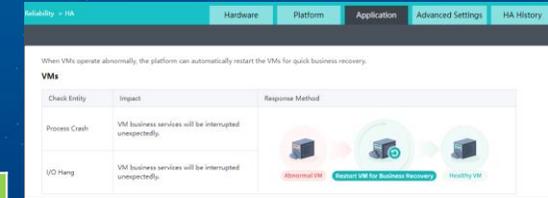
Proactively handles suboptimal health states through detection instead of passively migrating when failures occur

Intelligently predicts and reallocates host resources based on resource demands instead of experiencing direct HA failures

**Intelligent Live Migration**

# Disk Bad Sector Prediction And Repair (with aSAN)



| Prediction | Scanning | Repair |
|---|---|---|
| Result output: A bad sector will occur on disk A in 7 days | Disk A will be scanned in priority in the daily scanning task | Data is repaired once the bad sector is confirmed |
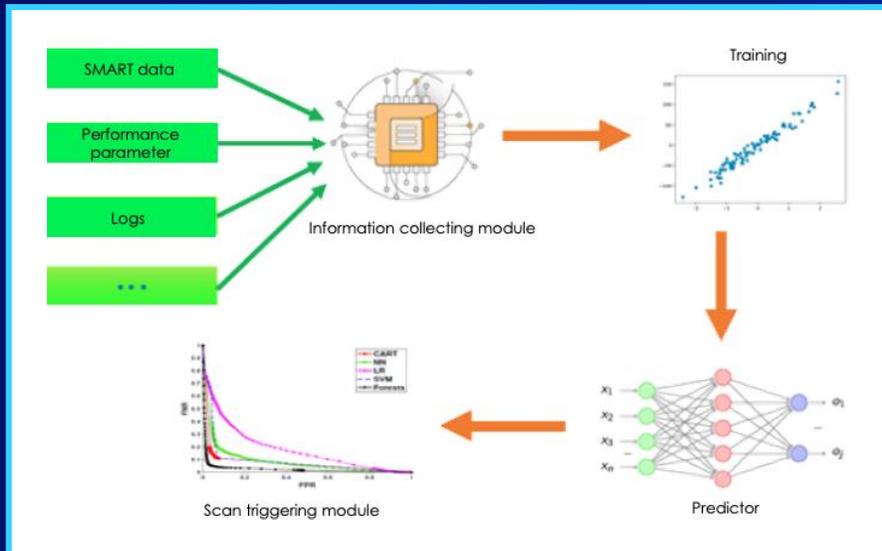
➢ The time it takes to discover bad sector is reduced from **weeks** to **1 day**, minimizing data loss risk.

# Sangfor Active-Passive Disaster Recovery
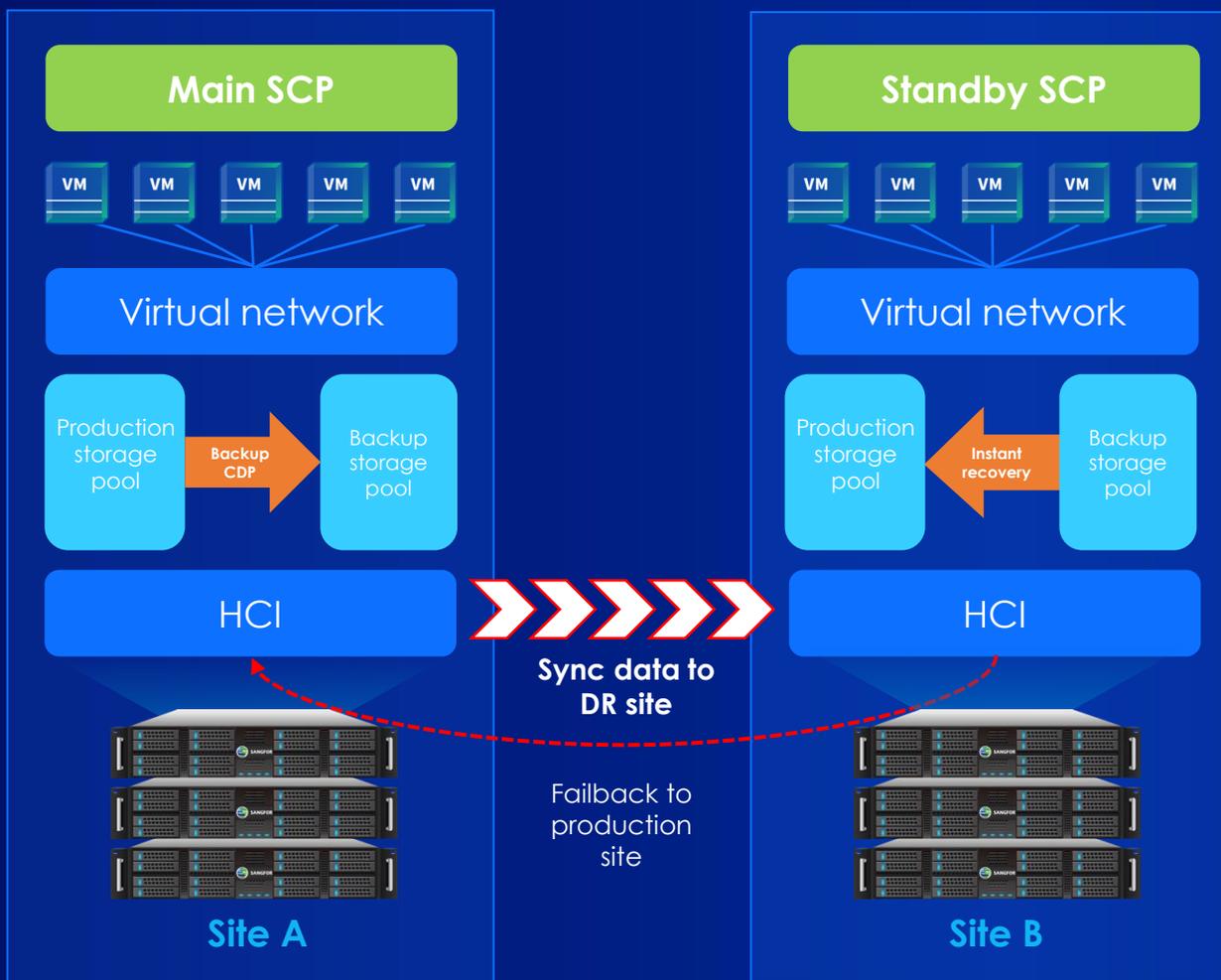


- ➢ Integrated and easy to use

- ➢ Local backup + remote replication

- ➢ Flexible RPOs, min. 1s

# Sangfor Active-Active Stretched Cluster
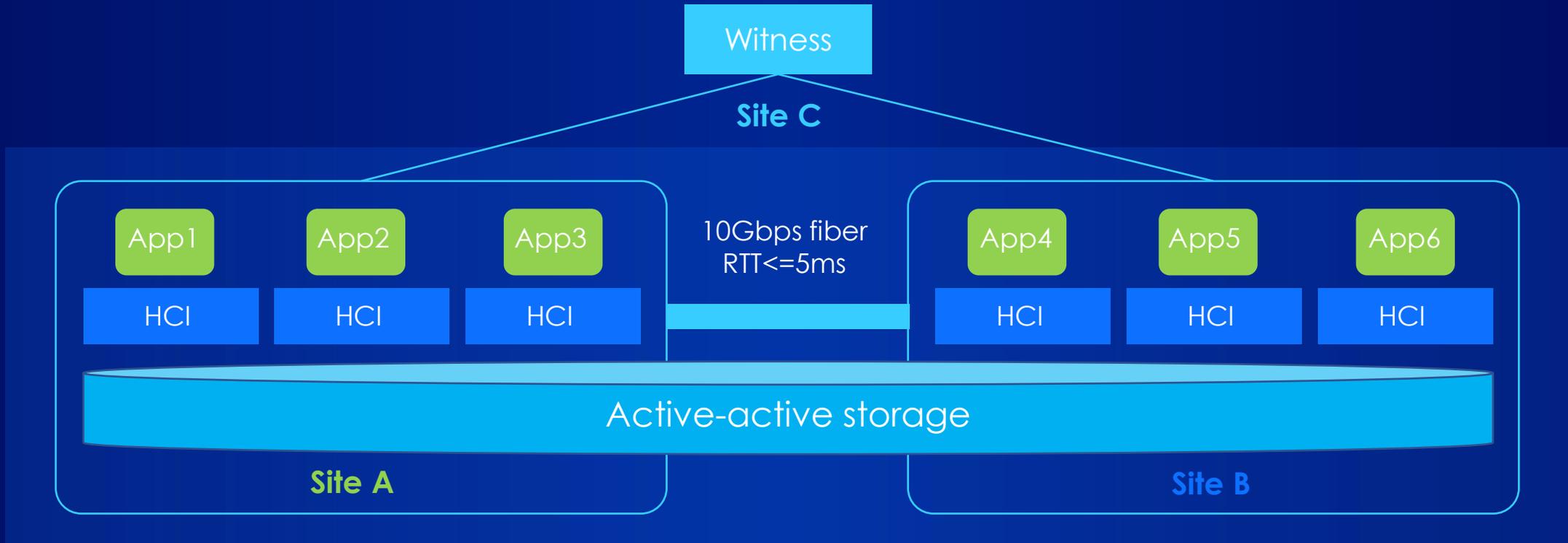
Sangfor Technologies

# Sangfor heterogeneous DR (hDR)

SANGFOR

**Prmary DC**      **1 Remote DR**      **On-Prem or Cloud DR**

LAN

CDP hot DR

DR Appliance

OS APP DATA      OS APP DATA      **VM sync Warm DR**

CDP/ data as-sync from source clients to On-prem DR Appliance

CDP/ data as-sync from source clients to Off-site DR Appliance

AF

APP OS   APP OS   APP OS

VM   VM

**Fast recovery of server/ data**

VMs

Phy Server

On-site DR Appliance

DR Replication

APP OS  APP OS  APP OS   APP OS  APP OS  APP OS   APP OS  APP OS  APP OS

OS APP DATA

**Heterogenous Primary Resource Pools**      **2 Local+Remote DR**      **Sangfor HCI Resource Pools**

**X86 Phy Server**

vmware

**Virtual Machines**

**Agent-less**

IBM   inspur   DELL
Hyper-V   CITRIX   openstack

**Agent-based**

APP
DATA
OS

**Heterogeneous DR**
Full server recovery, real-time sync

**Sangfor HCI/Cloud**

# Backup Copy to S3-Compatible Object Storage

| Features | Target Users | Values |
|---|---|---|
| Backup copy to S3 | MSP, CSP: HCI+SCP+S3 | 1. Improved data protection with backup copied to S3, supporting encrypting backup files. |
| | | 2. Reduced cost of off-site backup and archiving, lowering TCO and O&M difficulties. |
| | | 3. Better data compliance (especially for the European market). |

**A MySQL database VM needs to be configured on HCI to store metadata. 200GB disk space is required for 100TB of backup data.**

# Secure

# Sangfor HCI Security Architecture

## Platform Security

- HTTPS Login
- Anti-blasting
- 2FA Login
- Weak pwd detection
- Idle session timeout
- Resource Access Mgmt
- IP/MAC Whitelist
- Built-in WAF

## Platform Security

### aSEC-NFV

- NGAF
- IAG
- AD
- Log Audit (LAS)
- Database Audit
- BVT
- OSM

### aSEC
### Built-in Cloud Security Center

- Host Protection
- Asset Identification
- Event Mgmt
- Vulnerability Mgmt
- Built-in Network Security*

## Monitoring

- Operation Log
- Audit Log Backup
- Risky Behavior Alert
- Security Event Monitoring
- Security Monitoring Dashboard

## Coding Security

| SDL | Code Obfuscation | Code Vulnerability Scanning | Penetration Testing | Dependency Mgmt |
|---|---|---|---|---|

# Maximized Security, Inside out
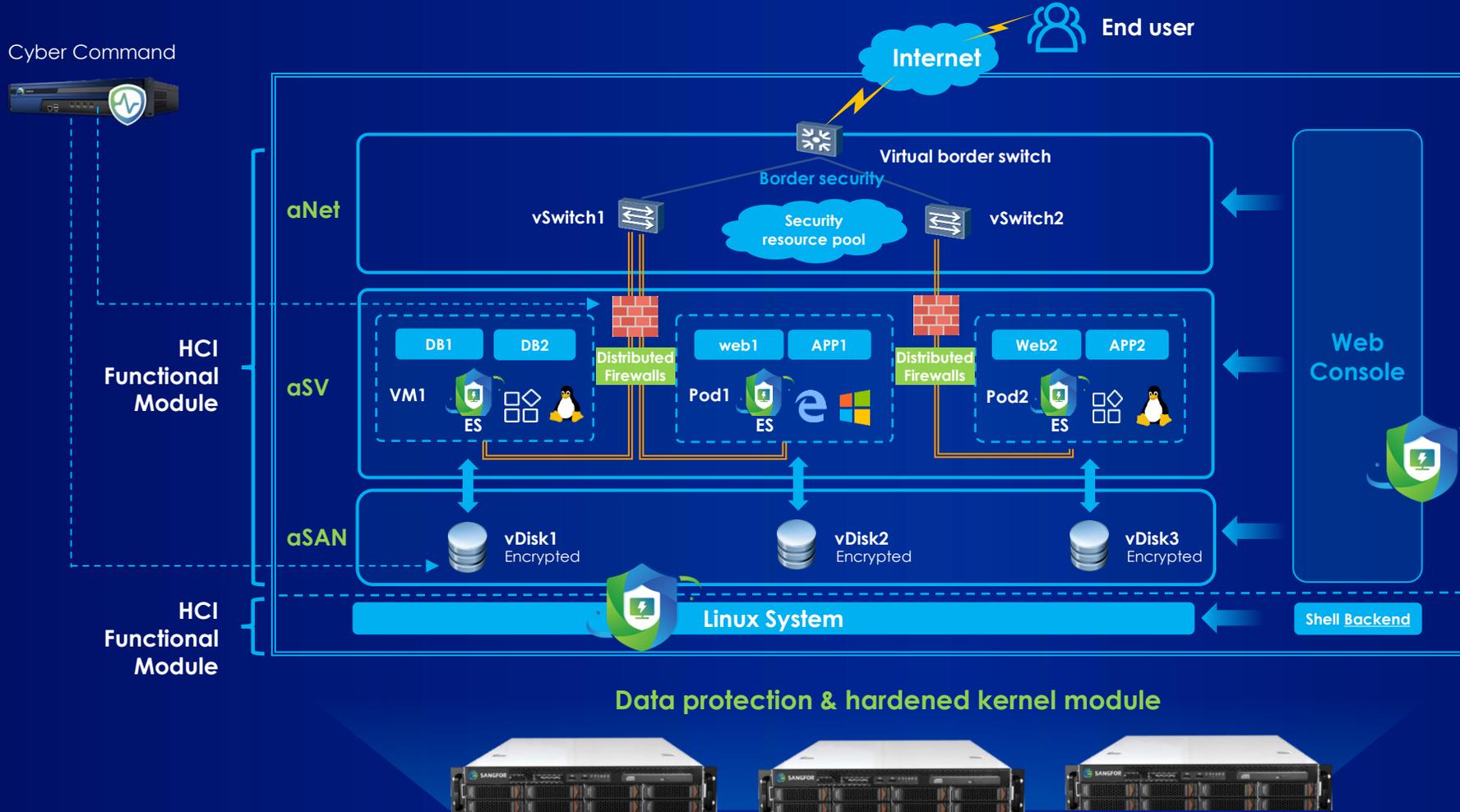


**Platform Security**
- Cyber Command correlated service

**Network Security**
- vAF
- Distributed FW

**Endpoint Security**
- Endpoint Secure integration

**Data Security**
- Encryption

**Kernel Security**
- Built-in WAF

# Working Together with Cyber Command



**Internet**

**Cyber Command**

NGAF

NGAF

NGAF

**Sangfor HCI**

VM

VM

- - - - - > Receive threat data
- - - - - > Send execution command
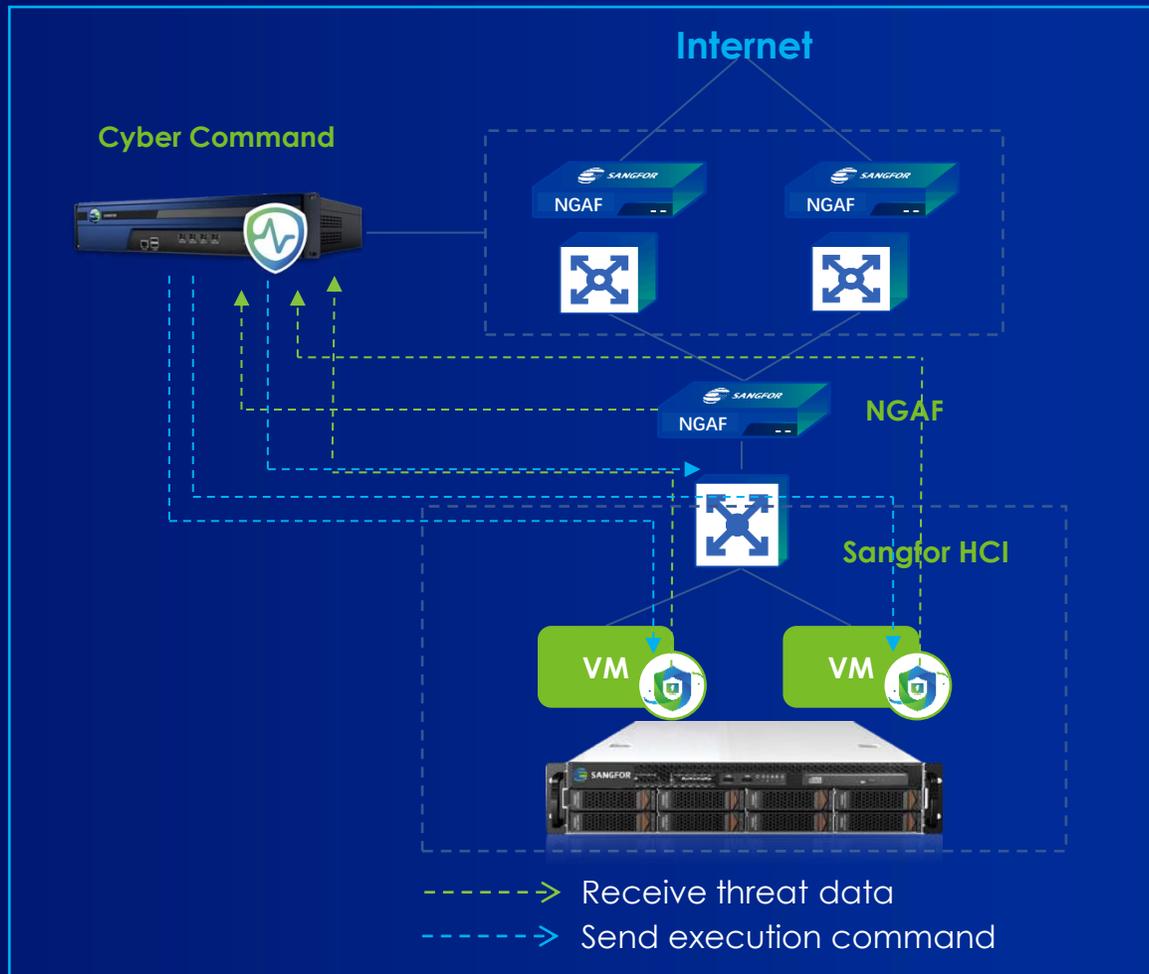
**CC detects security threats through network traffic analysis, NGAF and ES, and then takes action based on different threats:**

- For scenarios like zombie network, CC works with distributed firewall to quarantine infected cloud host automatically

- In ransomware scenario, CC leverages storage snapshot API to take snapshot of the infected VM to minimize loss

- For mining scenario, CC sends command to power off/ suspend the mining VM to avoid unnecessary resource consumption

- Manual/automated policy: policy can be issued manually on CC

# Automatic Endpoint Protection

**NODE**

**VM**

**Endpoint Secure**

- App Identification
- Real-time Detection
- Anti-virus
- Vulnerabilities Mgmt

HTTPS/TCP

Agent

VMTools

**Cloud Security Center**

**Automatic Installation**

**Hypervisor**
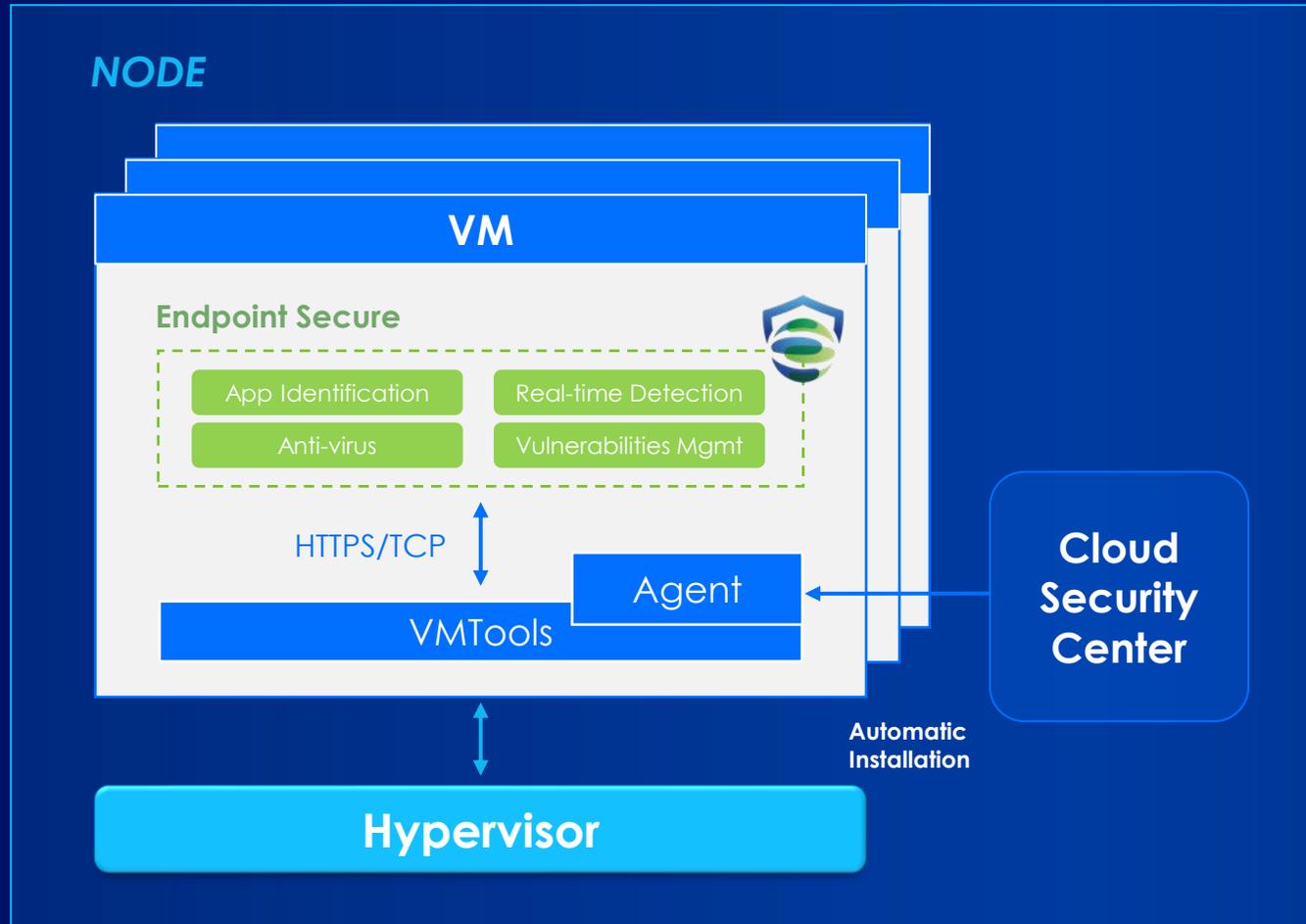
- Automatic Agent Installation

- Built-in Endpoint Secure Capabilities

- Low Resource Consumption

- File-level Protection for Linux

# aSEC 2.0 with Distributed IPS
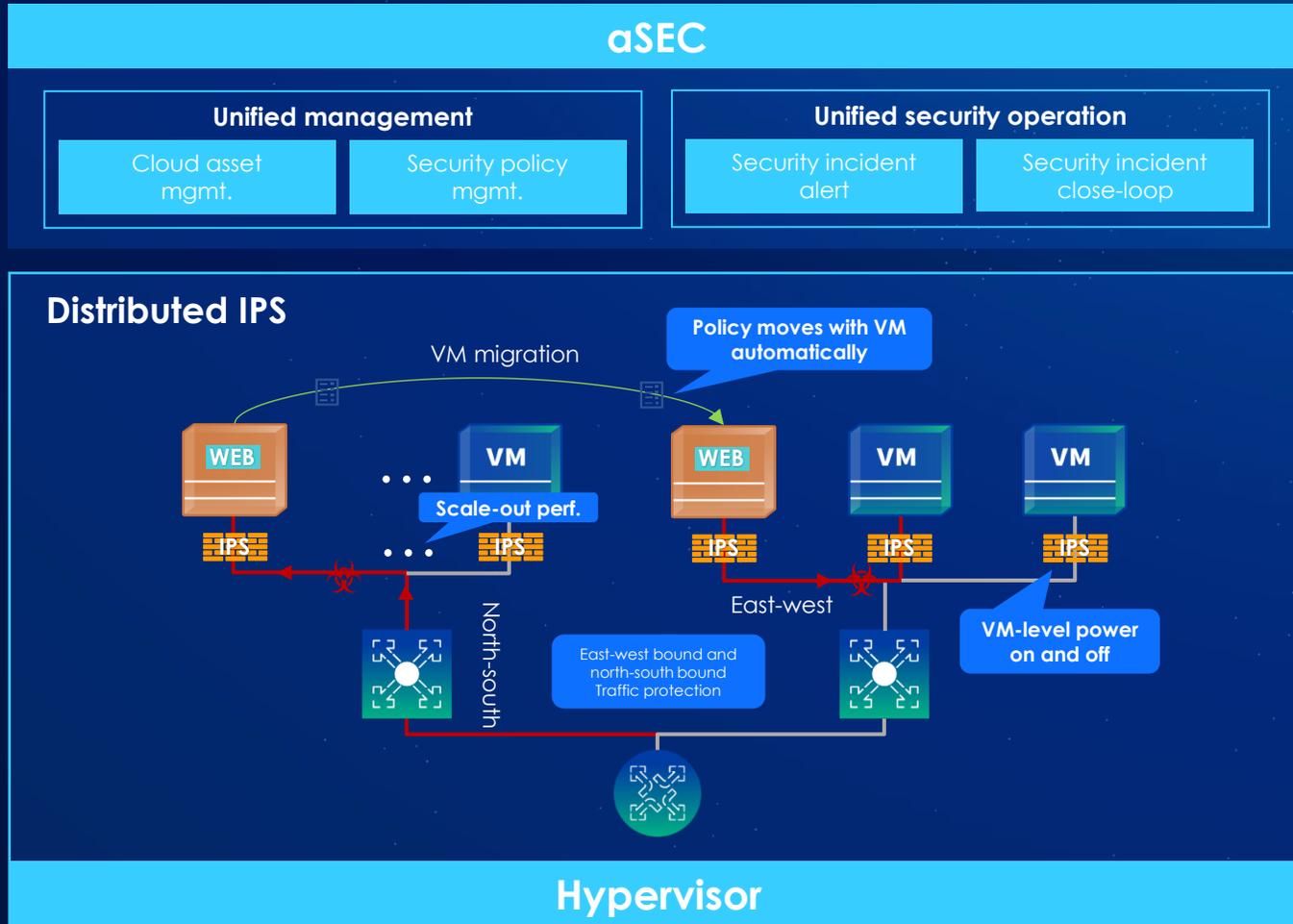


## Business is secured once it's online

- No additional deployment and configuration is required, 1-click security policy application.

## Adaptive security policy

- The security policy automatically follows the dynamic state of VMs.

## Unified management

- Unified management for both security and cloud resource.

## Flexible and scalable

- VM-level control granularity
- Scale out with business

# Automated Policy Recommendation for Micro-Segmentation

➤ Sangfor HCI 6.10.0 intelligently recommends policies for micro-segmentation by **visualizing aNI (Network Insight) flows**. It **relies on the effectiveness of distributed firewalls** rather than aSEC's distributed IPS engine. However, this feature belongs to the aSEC component, so it requires an aSEC license, not aNET. The price of the aSEC license **remains unchanged** in this version.



## Easy Configuration

Automatically generates access control policies between business VMs based on their application access relationships from the last 30 days. This helps operations personnel configure access control policies more quickly and easily.

## Effective Verification

After generating the policies, a visual preview of deployment effects is provided to spot misconfigurations or omissions. This allows for quick verification and adjustments to ensure policies don't negatively impact the business.

## Policy Alerts

The system continuously monitors business access patterns and raises alerts for abnormal access. This helps operations personnel identify and address any misconfigurations, enabling them to promptly restore application access.

# Disk Data Encryption
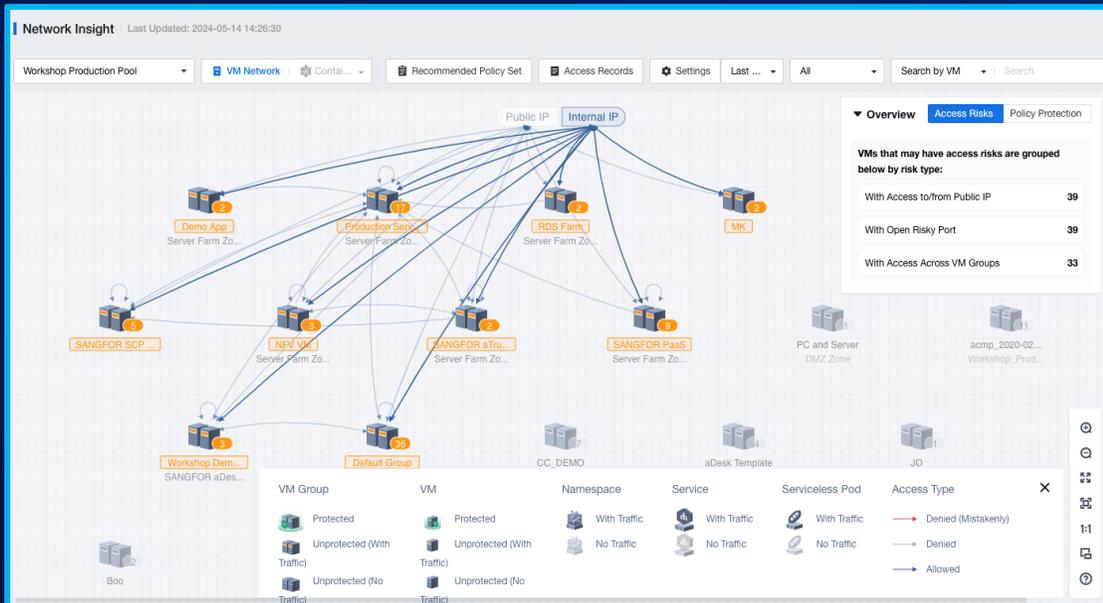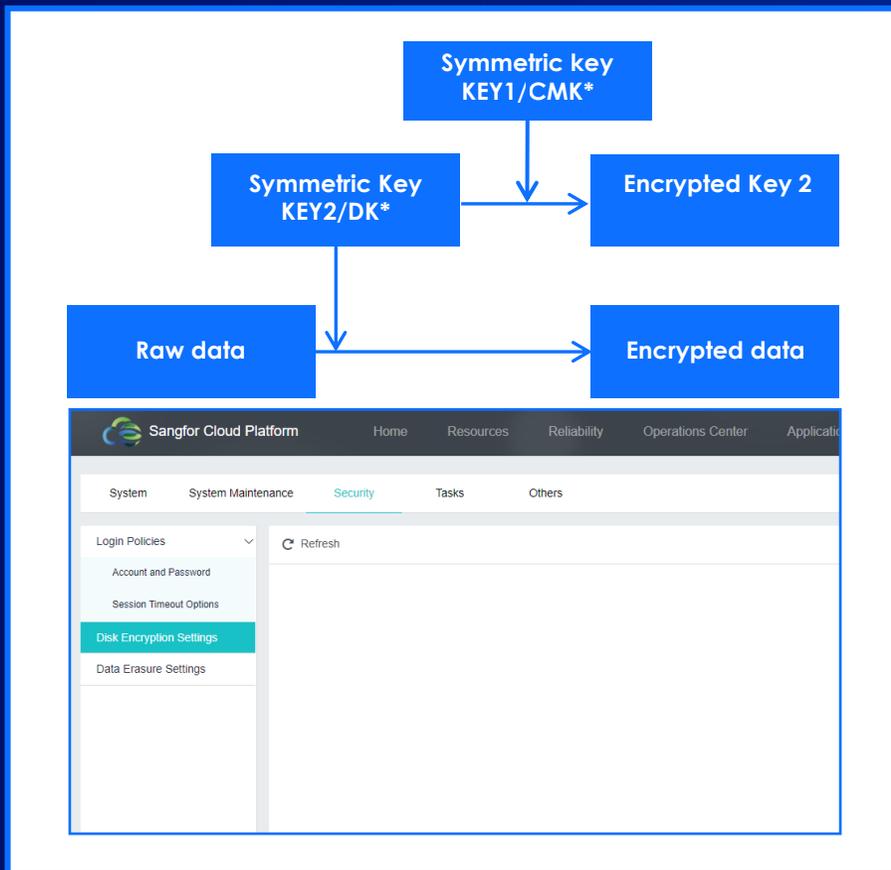


## Scenario

➤ Realizing the encryption of images and snapshoots based on VM disk encryption.

## Feature

➤ **Encryption algorithm:** AES-256, SM4.

➤ **Range:** one VM with one encryption module.

➤ **Key:** one VM with one key.
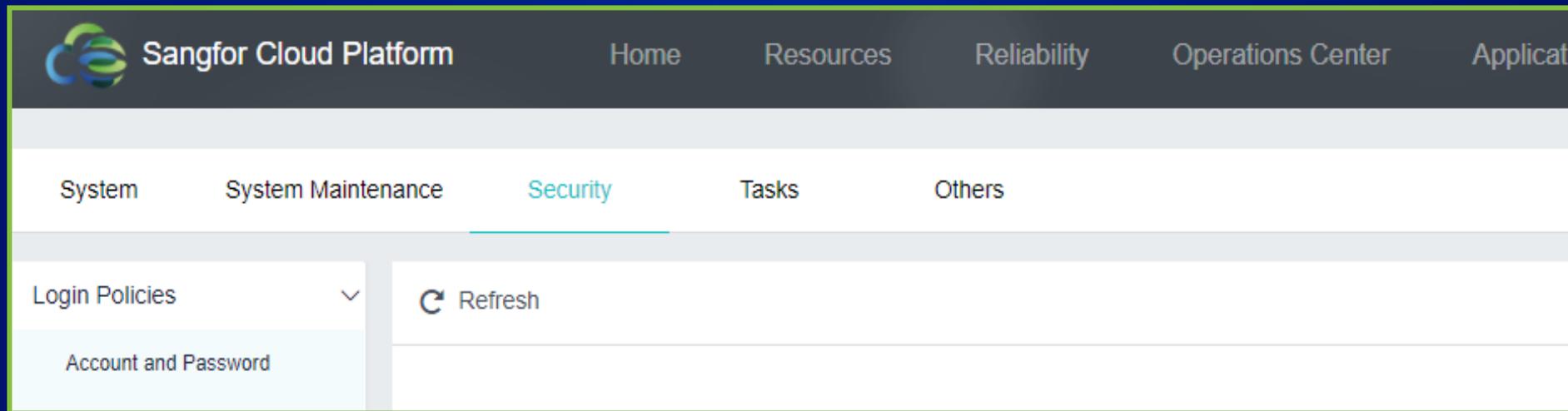
# Disk Data Erasure



## Scenario

- Ensuring the deleted data is completely wiped from the disk when recycling storage resource.

## Feature

- Wiping disk data thoroughly.
- Customized overwriting strategy.
- Supporting specific rate of overwriting and erasure for different cluster.

## Note

- Users' business system will be interfered in data erasure process because of occupancy of Disk I/O and CPU capacity.
- The wiped data cannot be recovered.

# High Performance

SANGFOR

# Panorama of High Performance Capabilities

**SANGFOR**

| Infrastructure | Application Layer High Performance | Performance monitoring |
|---|---|---|

## Infrastructure

- CPU
- GPU
- Memory
- High performance network card
- Hard disk
- Switching network

## Application Layer High Performance

| Shared disk optimization | Intelligent resource engine based on AI analysis | Database Best Practices Deployment | Database performance optimization assistant |
|---|---|---|---|

## Compute Layer High Performance

| I/O path optimization | NUMA technology optimization | Huge page memory | KMS memory coalescing |
|---|---|---|---|

## Network Layer High Performance

| Low Latency Optimization | Network Zero Copy Technology | Independent Forwarding Core Design | DPDK | Network card interrupt binding |
|---|---|---|---|---|

## Storage Layer High Performance

| Data tier-ing | I/O localization | Adaptive Cache Replacement Algorithm | Cross-host read cache |
|---|---|---|---|
| Data sharding | Adaptive Striping | Data multi-copy distribution | Data Balancing |

## Performance monitoring

- Cache hit ratio
- Traffic real-time monitoring
- Disk sub-health detection
- Latency real-time analysis
- One-click performance analysis

# New Product Available in 2023 – aStor EDS

**SANGFOR**

## 39% higher performance with Intel 6226R hybrid flash configuration

Sangfor ■ Vendor X ■

- 4K rand. read IOPS/k: 1610 / 1270
- 4K rand. write IOPS/k: 445 / 250
- 4K rand. 7/3: 975 / 540
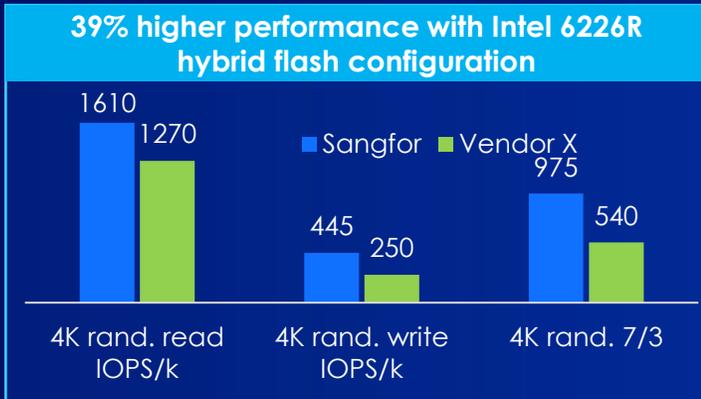
**3 nodes, 2* NVMe + 6* HDD + Turbo + 25G RDMA**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4K | randwrite | 89287 | 189024 | 111.7% | 357 | 756 | 111.8% |
| 4K | randrw 70% | 97441 | 254642 | 161.3% | 389 | 1018 | 161.7% |
| 4K | randread | 99214 | 266931 | 169.0% | 396 | 1067 | 169.4% |
| 8K | randwrite | 91922 | 164103 | 78.5% | 735 | 1312 | 78.5% |
| 8K | randrw 70% | 96608 | 248721 | 157.5% | 772 | 1989 | 157.6% |
| 8K | randread | 100158 | 262833 | 162.4% | 801 | 2102 | 162.4% |
| 4K | randwrite | 109826 | 223106 | 103.1% | 439 | 892 | 103.2% |
| 4K | randrw 70% | 100309 | 237138 | 136.4% | 401 | 948 | 136.4% |
| 4K | randread | 106051 | 245773 | 131.7% | 424 | 983 | 131.8% |
| 8K | randwrite | 101229 | 213505 | 110.9% | 809 | 1708 | 111.1% |
| 8K | randrw 70% | 104153 | 244669 | 134.9% | 833 | 1957 | 134.9% |
| 8K | randread | 116560 | 260387 | 123.4% | 932 | 2083 | 123.5% |
| 4K | randwrite | 177971 | 374448 | 110.4% | 711 | 1497 | 110.5% |
| 4K | randrw 70% | 291351 | 683085 | 134.5% | 1165 | 2732 | 134.5% |
| 4K | randread | 292469 | 796123 | 172.2% | 1169 | 3184 | 172.4% |
| 8K | randwrite | 160336 | 361886 | 125.7% | 1282 | 2895 | 125.8% |
| 8K | randrw 70% | 291402 | 635965 | 118.2% | 2331 | 5087 | 118.2% |
| 8K | randread | 296678 | 789441 | 166.1% | 2373 | 6315 | 166.1% |
| 4K | randwrite | 170068 | 418605 | 146.1% | 680 | 1674 | 146.2% |
| 4K | randrw 70% | 355420 | 751206 | 111.4% | 1421 | 3004 | 111.4% |
| 4K | randread | 804533 | 1385222 | 72.2% | 3218 | 5540 | 72.2% |
| 8K | randwrite | 158078 | 395798 | 150.4% | 1264 | 3166 | 150.5% |
| 8K | randrw 70% | 336506 | 718905 | 113.6% | 2692 | 5751 | 113.6% |
| 8K | randread | 638913 | 1280532 | 100.4% | 5111 | 10244 | 100.4% |
| | | | | 82.4% | | | 82.4% |

### Compute

**Heavy-load VM Intelligent Scheduling**
- Large-core VM CPU scheduling optimization
- NUMA resource affinity

**20% increase in CPU scheduling efficiency**
**10% increase in resource reservation**

### DB

**Oracle DB performance optimization**

**10% increase in overall DB performance**
**20% higher performance than peers**

### Storage

**Turbo SPDK Kernel Acceleration RDMA**

**50% higher throughput**
**20% higher IOPS**
**35% higher write performance**

### Network

**SR-IOV Low Latency Transmission**
- DPDK data processing optimization
- Network forwarding process affinity

**20% higher network performance**
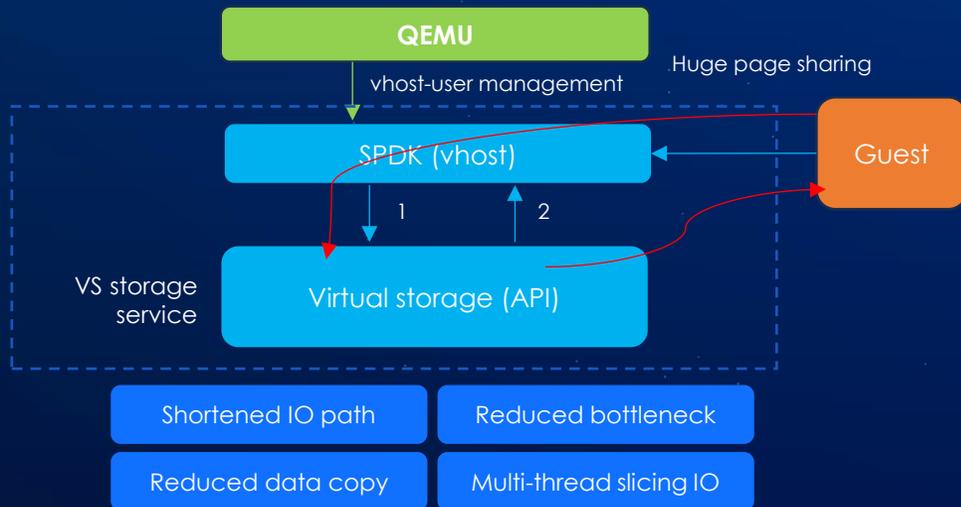**>90% bandwidth utilization across hosts**

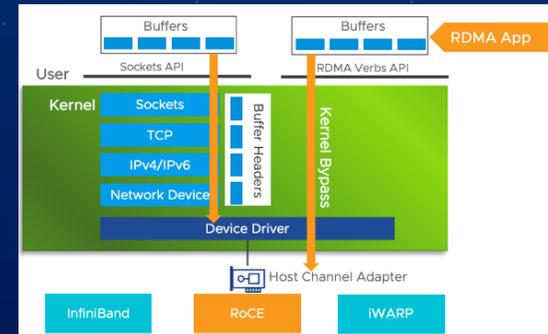# Greatly Reduced IO Latency with SPDK Turbo and RDMA

## SPDK-based Turbo Boost

➤ SPDK (Storage Performance Development Kit) is a toolkit used to build high-performance storage applications. In the virtualization layer, Sangfor HCI utilizes SPDK vHost technology to run VMs in user space, **enabling IO streams to bypass the kernel and access hardware directly**, thereby reducing the scheduling performance overhead caused by virtualization traps.

➤ With Turbo acceleration based on SPDK vHost, average latency for large block mixed read-write operations is reduced from 4ms to 2ms, **improving throughput efficiency by approximately 50% while increasing small block IOPS by over 20%.**

**QEMU**

Huge page sharing

vhost-user management

VS storage service

**SPDK (vhost)**

1   2

**Virtual storage (API)**

Guest

Shortened IO path   Reduced bottleneck
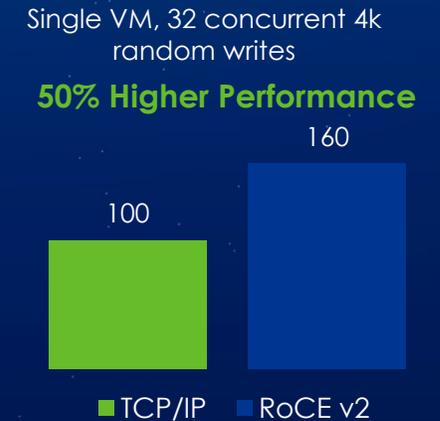
Reduced data copy   Multi-thread slicing IO

## RDMA Network

➤ RDMA (Remote Direct Memory Access) allows computers to directly transfer data to memory without involving the operating system, thus avoiding the performance overhead of traditional TCP/IP network protocol stack in system calls and memory copying. Distributed storage based on RDMA significantly reduces data transmission latency between different nodes and improves storage network efficiency.

➤ Sangfor HCI introduces RDMA in virtual storage using the RoCE v2 protocol. Combining single and dual-sided communication, it **boosts write performance by over 35% and outperforms competitors by 90% in small block write scenarios.**

Buffers          Buffers          RDMA App

User   Sockets API          RDMA Verbs API

Kernel   Sockets
         TCP         Buffer Headers   Kernel Bypass
         IPv4/IPv6
         Network Device
                    Device Driver

Host Channel Adapter

InfiniBand   RoCE   iWARP

**The NICs and switches must support RDMA protocol**

Single VM, 32 concurrent 4k random writes

**50% Higher Performance**

160

100

■TCP/IP   ■RoCE v2

*RDMA is only supported by virtual storage*

# Fully Optimized Network Performance

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## Sangfor HCI Network Performance Test

| Testing Model | VM Location | Device in Between | Test Results |
|---|---|---|---|
| Intro-host | Single flow | Virtual switch | 23Gbps |
| | | Virtual router | 23Gbps |
| | Multi-flow | Virtual switch | 46Gbps |
| | | Virtual router | 42Gbps |
| Inter-host (20Gbps) | Single flow | Virtual switch | 8Gbps |
| | | Virtual router | 8Gbps |
| | Multi-flow | Virtual switch | 19Gbps |
| | | Virtual router | 18Gbps |

## Low-Latency Network Performance

| Testing Model Sockperf | Physical NIC | SR-IOV (VF) | |
|---|---|---|---|
| | Physical to Physical | VM to Physical | VM to VM |
| 64 Byte | 2.30 μs | 2.33 μs | 2.32 μs |
| 128 Byte | 2.34 μs | 2.37 μs | 2.35 μs |

**vCPU Binding**
Binds vCPUs to VMs to reduce resource contention and scheduling overhead. Improves cache hit rates and stabilizes network latency.

**SR-IOV Acceleration**
Uses SR-IOV acceleration and user-space protocols to avoid the scheduling overhead caused by the virtualization layer.

**pCPU Scheduling**
Introduces low-latency network cards and application-layer technologies like VMA or onload to reduce network overhead from the VM OS.

**Onload Technology**
Groups and schedules hypervisor CPU core and cache resources to minimize network jitter caused by CPU resource contention between HCI services and VMs.

# New Product Available Since 2023 – aStor EDS



**App**

| VM/DB | Docker | windows | File | APP | App |

| DB/VM/CMP | Container | Windows File Sharing | Linux File Sharing | Applications | Applications |

iSCSI    Cinder    CSI    CIFS    FTP    NFS    S3    SWIFT    NFS

**SW**

| SAN | NAS | Object | HDFS |

**Sangfor aStor**

**HW**

**All Flash Resource Pool**

**Hybrid Disks Resource Pool**

**Server Cluster (Scale Out)**
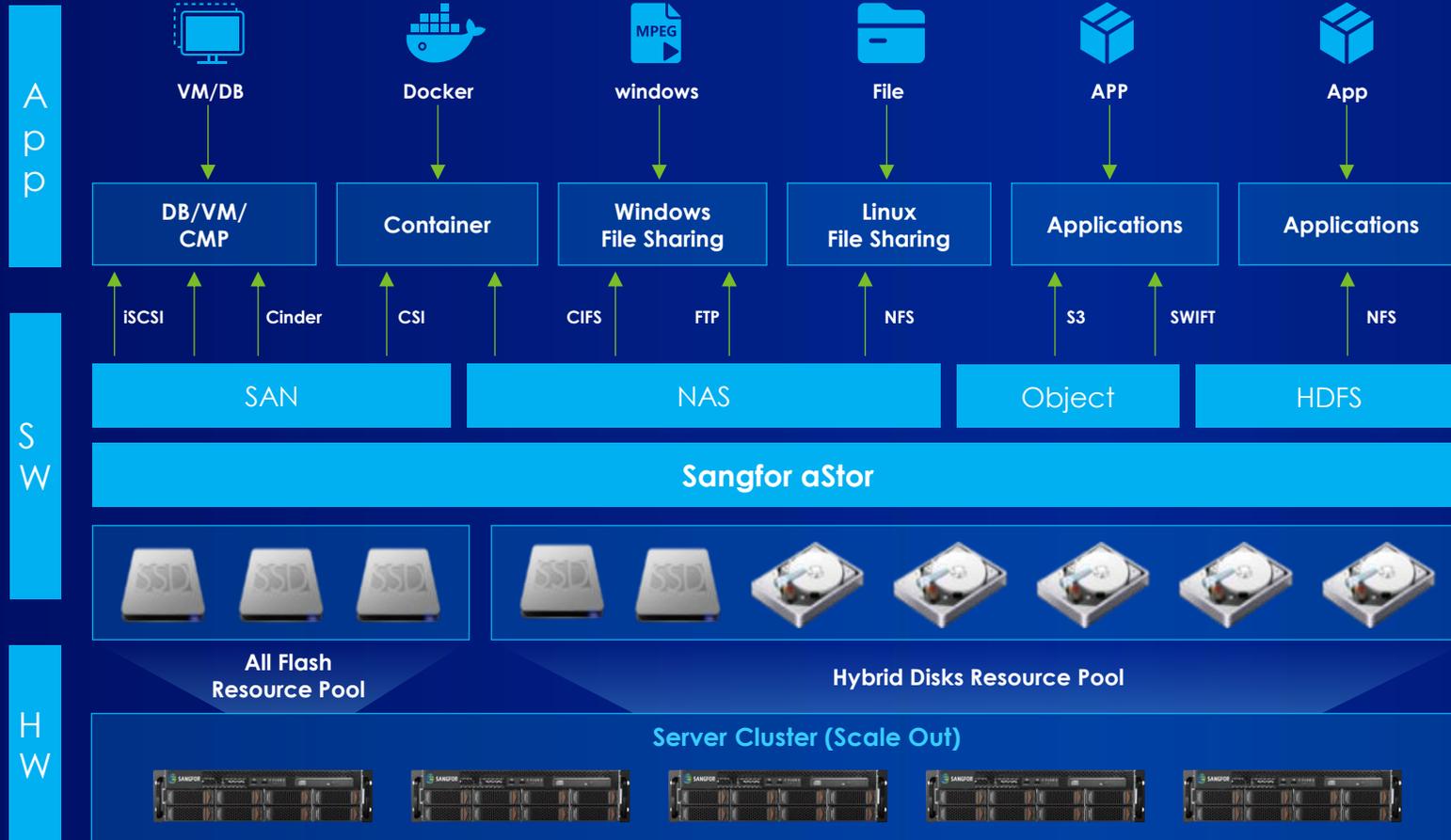
## High Compatibility
A cluster supports multiple storage types of blocks, files, objects, and big data, using over a dozen storage protocol interfaces, making it widely compatible with business applications.

## Agile Iteration
The aStor storage software uses the agile development model with rapid iteration, which can quickly support new scenarios and applications.

## HW Decoupled
Consolidation means lower cost on scale out and replacement providing minute-level expansion of capacity to quickly meet changing business needs; Quick adaptation of new hardware (eg: U.2 NVMe, Optane memory, etc.)

# New Solution Available Since 2023
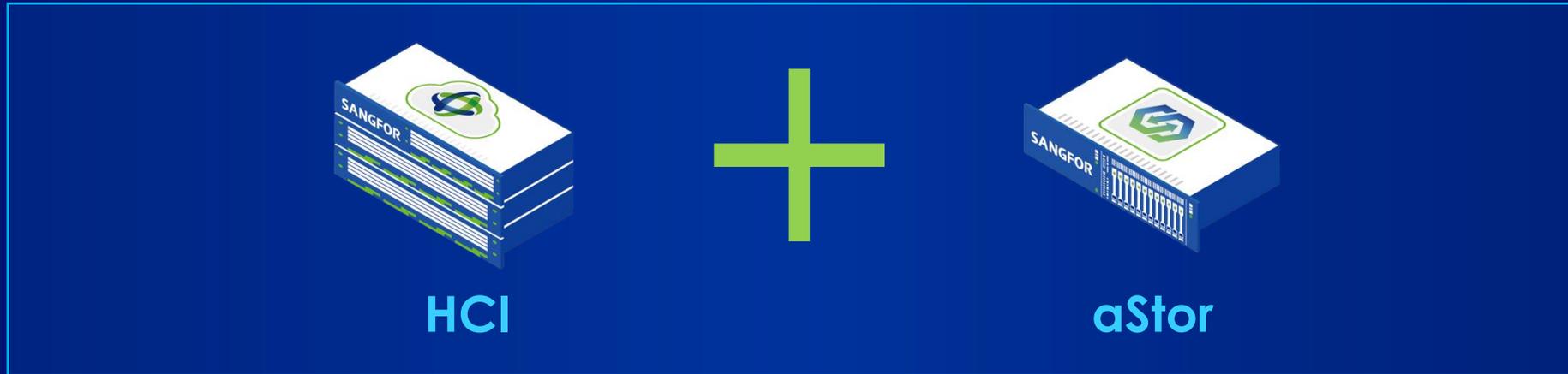


HCI     +     aStor

**HCI + aStor Use Cases**

- **Large capacity:** aStor provides better per GB cost than HCI in large capacity storage deployment
- **Backup:** aStor serves as the backup repository for HCI
- **New storage protocols (file & object):** applications that require file or object storage can leverage aStor.

# The Best Building Block for Your Hybrid Cloud
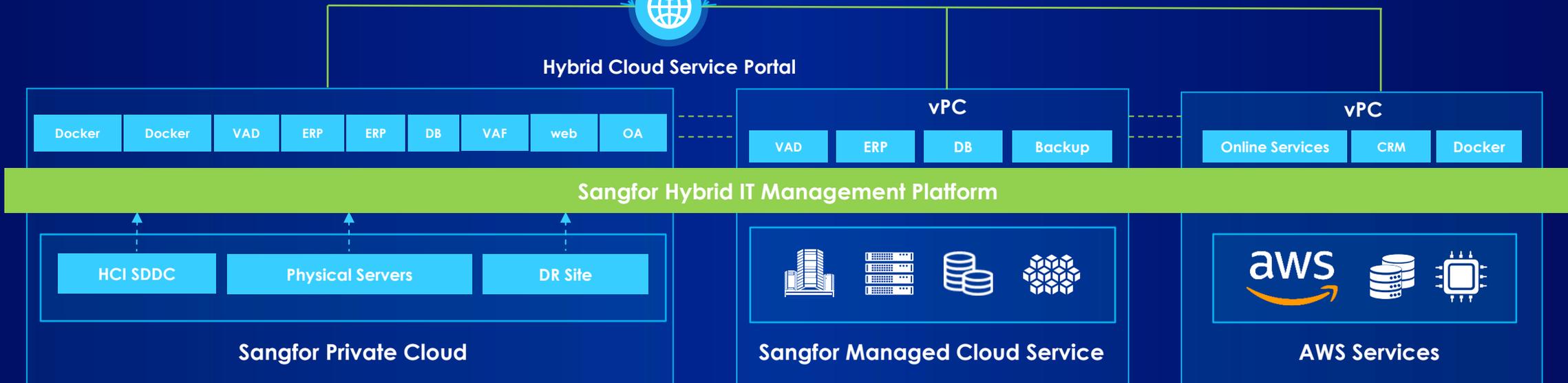
**SANGFOR**

## Homogeneous Hybrid Cloud

- ✓ Unified management
- ✓ Security consistency
- ✓ Simple and easy start
- ✓ Cost effective

Subsidiary    Sub-Department    Remote Access    Branch (VDI)

## Sangfor MCS

- ✓ Managed Private Cloud
- ✓ Critical Applications
- ✓ Backup & DR Services
- ✓ Hybrid Cloud Managed Services

**Hybrid Cloud Service Portal**

| Docker | Docker | VAD | ERP | ERP | DB | VAF | web | OA |
|--------|--------|-----|-----|-----|----|----|-----|----|

**vPC**

| VAD | ERP | DB | Backup |
|-----|-----|----|----|

**vPC**

| Online Services | CRM | Docker |
|-----------------|-----|--------|

**Sangfor Hybrid IT Management Platform**

| HCI SDDC | Physical Servers | DR Site |
|----------|------------------|---------|

**Sangfor Private Cloud**

**Sangfor Managed Cloud Service**

**aws**

**AWS Services**

# Target Use Cases

## Data Center Consolidation

- Full convergence of compute, storage, networking and security, massive TCO reduction

- Extremely simplified data center operation with "what you draw is what you get

## Enterprise Applications

- Intuitive guiding wizard for Oracle and SQL Server to drastically simplify database set-up and operations

- Optimized architecture to ensure application performance and data reliability

## Data Protection & DR

- Integrated backup and CDP to meet various data protection requirements

- All in one without 3rd party data protection software to simplify management and cut cost
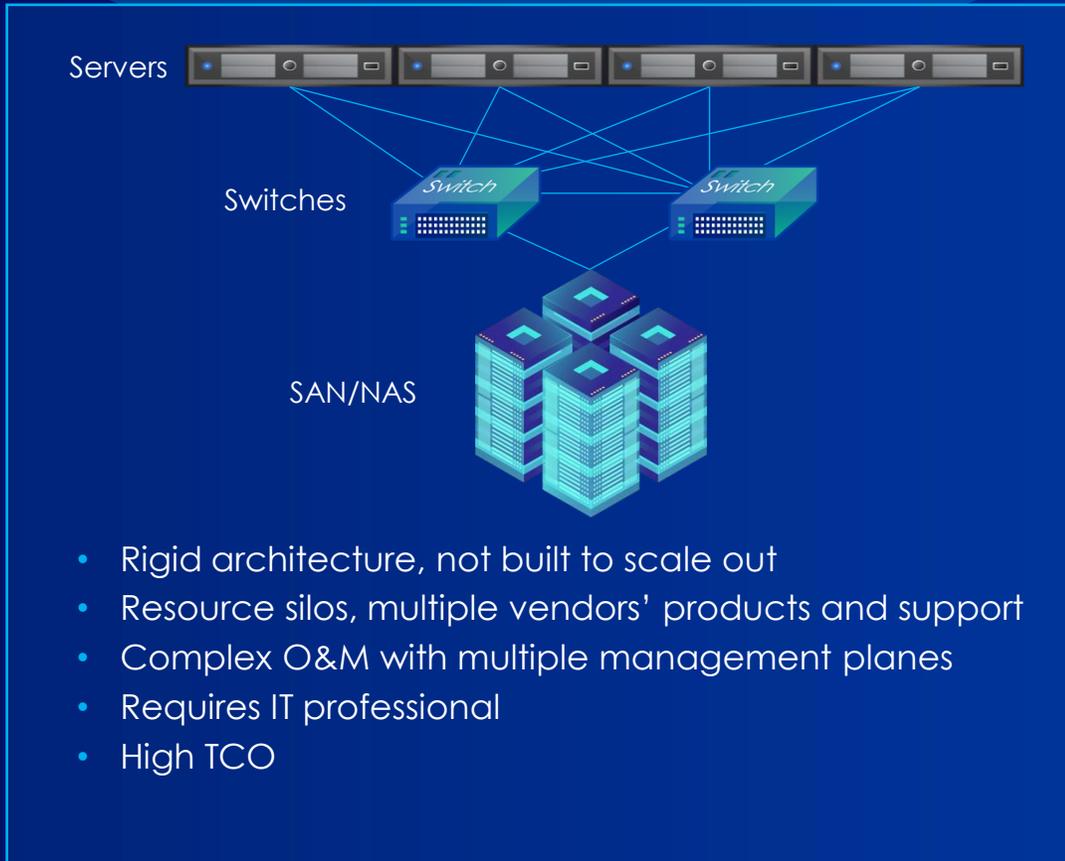
- DR orchestration & testing

## Cloud Transformation

- All-in-one private cloud solution with all the beauty from HCI

- Smooth evolution to hybrid cloud and multi-cloud
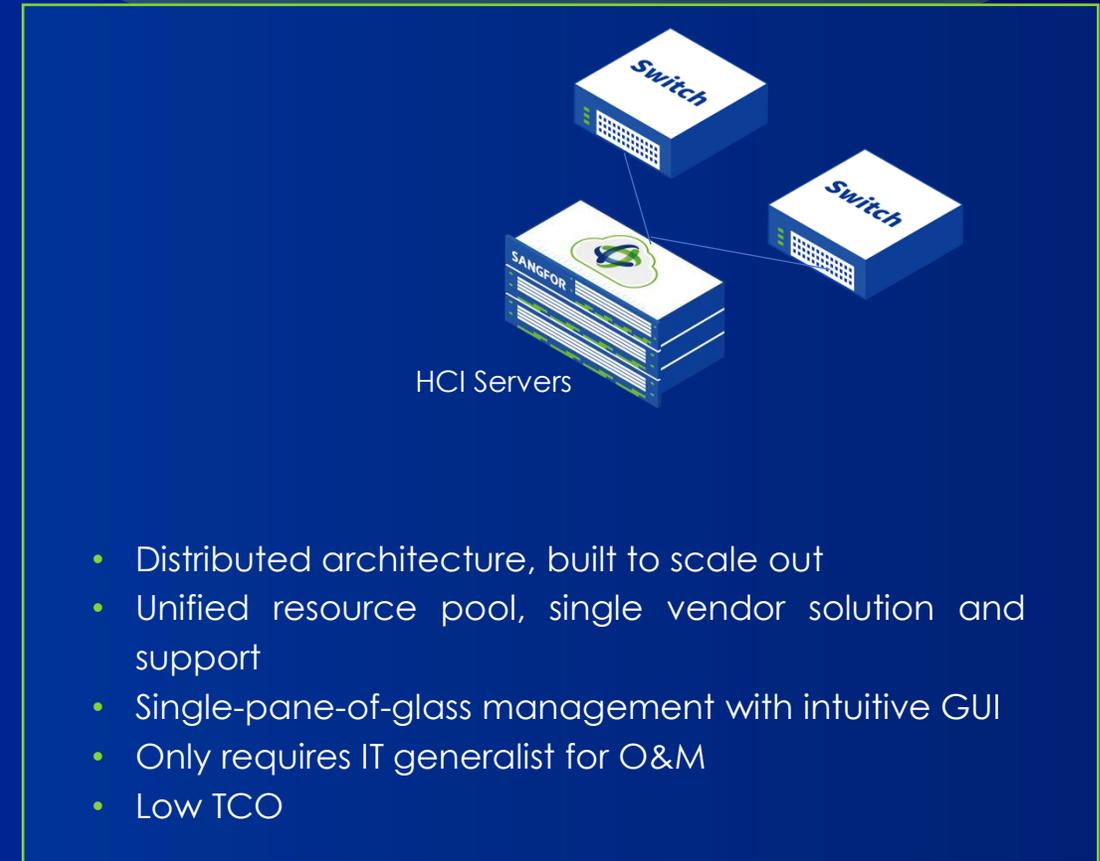
- Cloud-native workload support

# Sangfor HCI v.s. Traditional 3-tier Infrastructure

**Traditional 3-tier infrastructure**

**Sangfor HCI**

Servers

Switches

SAN/NAS

HCI Servers

- Rigid architecture, not built to scale out
- Resource silos, multiple vendors' products and support
- Complex O&M with multiple management planes
- Requires IT professional
- High TCO

- Distributed architecture, built to scale out
- Unified resource pool, single vendor solution and support
- Single-pane-of-glass management with intuitive GUI
- Only requires IT generalist for O&M
- Low TCO

# Business Benefits Brought By Sangfor HCI

Up to **70%** TCO

Reduction

**50%**

TTM Reduction

**30%**

Higher Performance

# Licensing Structure

**SANGFOR**

## Basic License Suite

### aSV
| HA | DRS | DRX |
|----|-----|-----|
| Clone | Backup | |

### aSAN
| Virtual storage | caching |
|-----------------|---------|
| Data Locality | |

### aNET
| aNI | DFW |
|-----|-----|
| Router | Switch |

### aSEC
| Cloud security center | Micro-segmentation |
|-----------------------|--------------------|
| | vAF | IPS |

## Advanced License Suite

| SCP | aDR | hDR | CDP |
|-----|-----|-----|-----|
| aSC stretched cluster | aHM (VMware backup) | SKE | DMP |

# HCI Roadmap

**SANGFOR**

**SANGFOR CLOUD**

**1**
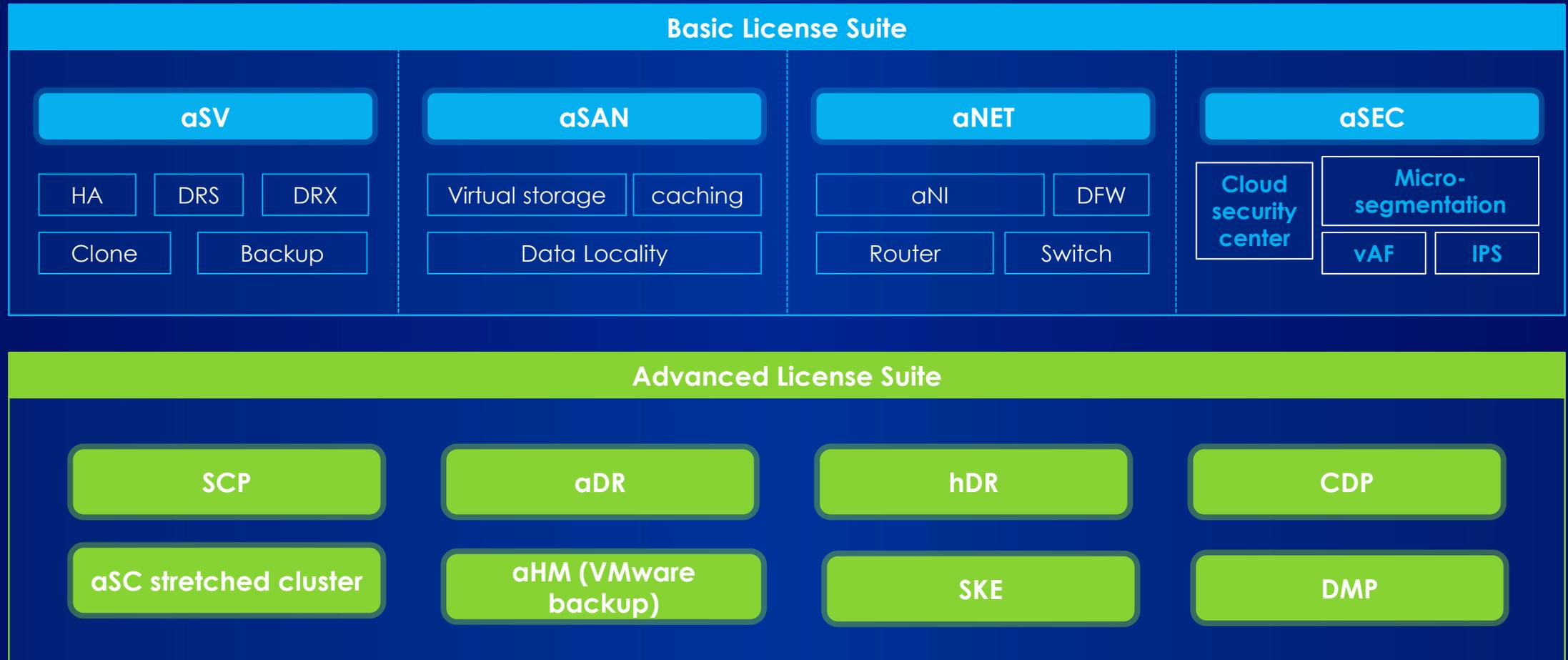
### SCC deployment on-premises (CSP scenario) (2024Q3)

- SCC supports deployment on-premises and manages multiple SCP+HCI
- Operational capabilities: Metering and billing, payment gateway, tenant self-registration, resource expiration reminder.
- O&M capabilities: Operations delegation, SkyOps deployment on-premises.
- DR scenario: On-premises DC DR to off-premises managed cloud.

**2**

### HCI & SCP 6.11.0 pre-release (2024Q4)

- Unified physical network configuration on HCI & SCP to improve management efficiency.
- The platform administrator can be assigned the same permissions as the super admin.

**3**

### SkyOps 3.0 (2024Q4)

- Database Monitoring and Performance Diagnosis: Supports Oracle standalone and cluster version monitoring. Indicators include: configuration parameters, TPM/TPS, table space, index structure, and other 100+ indicators. Provides SQL optimization suggestions according to slow database and failure points.
- VDC Alert Management: Improve the accuracy of VDC alerts, with a false alert rate lower than 20%.
- aStor Monitoring: Supports monitoring of performance trends, capacity, slow disk, etc.

# Gaining Momentum With Global Expansion

**SANGFOR**

## China HCI Market Overview, 2021

$1.8B

Others 15%
22%
21%
Sangfor 15%
11%
9%
4%
3% 1%
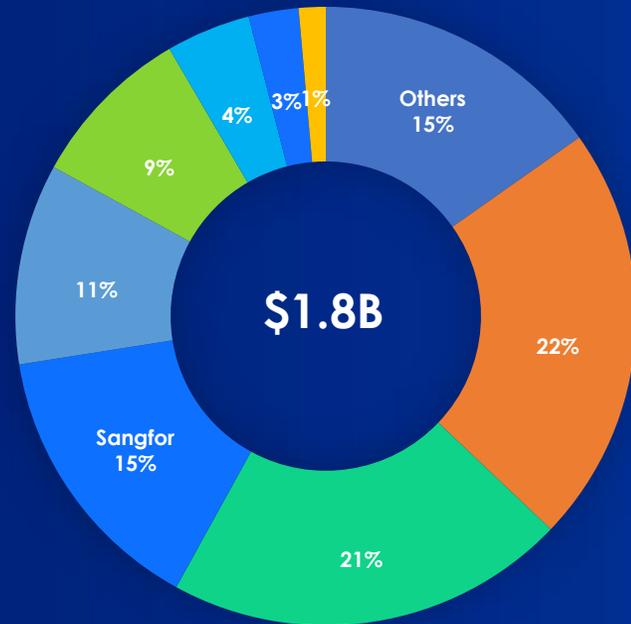
Top 3 HCI software provider in China according to IDC for 6 years

Mainland China
South Africa
Hong Kong/Taiwan/Macau
Singapore
Malaysia
Italy
USA
Thailand
Indonesia
South Korea
Pakistan
Philippines
Vietnam/Myanmar
UAE

# Signature Case Study - MOHR

**6 unit** HCI Appliance     **>500K** IOPS     **>60%** Efficiency
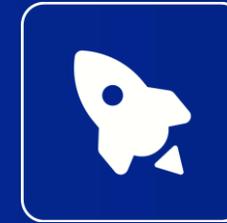
➢ Too many servers to be maintenanced

➢ One server, one application, resources is not optimized

➢ Space become limited with too many legacy servers in occupation

➢ Electricity cost increases dramatically

# Case Sharing

## Customer overview

- Art Serina Piston & DYNA Metal are both factories under SERI-WATHANA ENTERPRISE. The provide pistons, bearings and other component to major automobile companies. As joint venture company with Japan, many of the customers are Japanese companies.

## Challenges

- Constant and stable supply
- Traditional server + SAN architecture lack local redundancy and HA
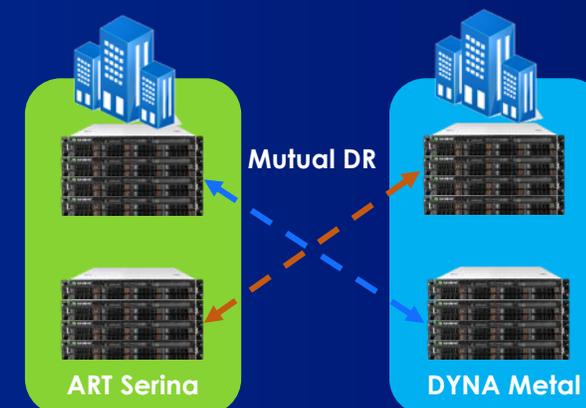- Suffered flood disaster in the past which caused significant product line downtime

## Solutions

**Phase 1  2017 Q3**

- Art Serina purchased 3* aServer 2000 for data center consolidation

**Phase 2  2018 Q4**

- Art Serina got additional 2* aServer 2005 for DR
- DYNA Metal deployed aCloud software on existing servers and enabled DR
- Mutual DR between Art Serina site and DYNA Metal site

**Simplified, reliable, one-stop and cost-effective**

Mutual DR

ART Serina

DYNA Metal

# Customers Who Chose Sangfor HCI

Sangfor Technologies

# Sangfor HCI Success Customer Videos

- Jakarta Eye Center: https://www.youtube.com/watch?v=RM0KEtKPKeY

- Ramsay Sime Darby Healthcare: https://youtu.be/VvOdx1ZGEzA

- The Medical City South Luzon: https://youtu.be/TblkxQSTqmc

- J&T Express Indonesia: https://youtu.be/2GF9U6pGy6Y

- fastERA (Italy): https://youtu.be/Soltf1LVC8c