

Security Level:

FusionSphere<sup>Enabled</sup>

# Simple Management, Extreme Performance

Leader of Simple, Extreme Virtualization Solutions



# Contents

Key Information About Huawei FusionSphere Virtualization

Introduction to Core Features of Huawei FusionSphere 6.3.1

Huawei FusionSphere Success Stories

# FusionSphere 6.3.1 KM: Simple Management and Extreme Performance

## Simple Management and Extreme Performance

### Positioning: Leader of Simple, Extreme Virtualization Solutions

#### Simple Management

##### Unified site management

Supports unified management and O&M of up to 128 sites.

##### VMware resource management

Manages existing VMware resources, protecting customers' investments.

##### Robust reliability

Offers flexible DR solutions (two-site three-center, metropolitan active-active, and cross-region DR), ensuring service continuity. Uses agentless antivirus component to build a secure ecosystem.

##### Cloud evolution

Supports smooth migration of physical servers and third-party platforms.

Supports smooth evolution from FusionSphere virtualization to FusionCloud private cloud.

#### Extreme Performance

##### High-specifications VM

255 CPUs/4 TB, meeting requirements of high-specification service VMs

##### High-performance virtualization

Brand-new KVM engine for enterprise-level, SPECvirt-leading performance

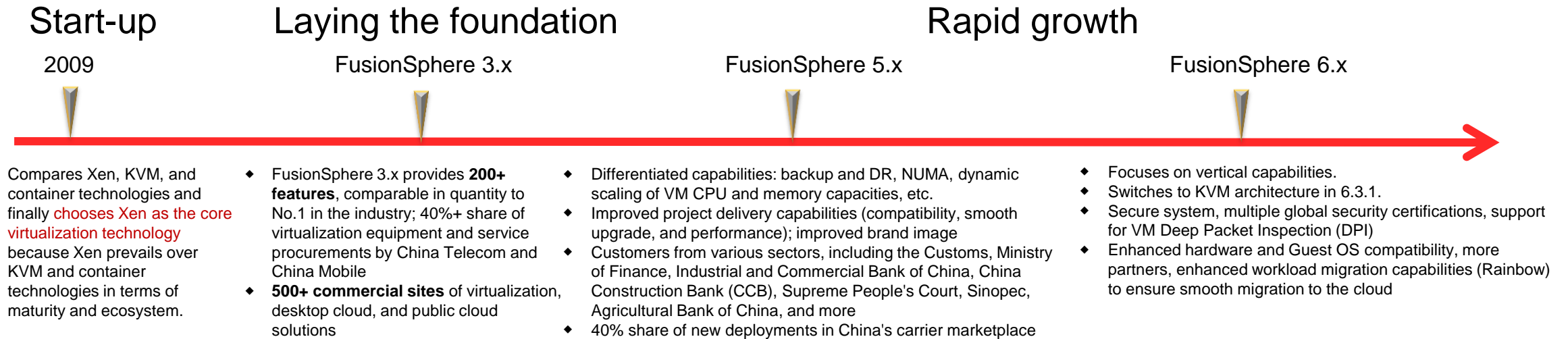
##### GPU-enhanced

P4/P40/P100 GPU passthrough and virtualization, adapting to deep learning, graphics rendering, and complex computing

##### High-performance network

OVS+DPDK network optimization (> 20 Gbit/s), requiring only 4s to transmit 10 GB video data

# History of FusionSphere



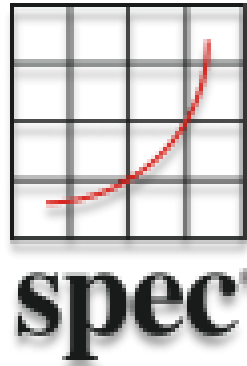
- ✓ With an open and collaborative philosophy, Huawei has joined with **575** partners, including Intel and SAP, to provide a complete lineup of industry-specific IT solutions. These products and solutions help enterprises build an advanced, facilitated IT platform to improve their operating efficiency and business agility.
- ✓ As of March 2018, Huawei Cloud Computing serves over **4300** customers in **144** countries and regions, covering government and public utilities, carrier, energy, finance, transportation, manufacturing, media, healthcare, education, and many other industries; Huawei has deployed more than **3.8 million** VMs with more than **1.1 million** Virtual Desktop Infrastructure (VDI) users around the world.
- ✓ **Forrester recommends Huawei to the public cloud market in Europe.** Forrester's report emphasizes the leading role Huawei has played in the public cloud market in China, and introduces Huawei's FusionCloud solution. It analyzes Huawei's partnership with Deutsche Telekom and Telefonica on the public cloud and concludes Huawei as reliable in technology, competitive in cost, and an IaaS provider worth recommending to CIOs.
- ✓ According to the latest 2017H2 SDC Software Tracker released by IDC, Huawei takes the **2nd spot** in the global software-defined compute (SDC) market, and continues to hold the **top spot** in China's cloud system software (CSS) market.

# Authoritative Tests and Certification in China

	Name	Certification Benefits	Result
1	Trusted cloud service authentication	The first authoritative evaluation of public cloud and cloud services in the country	The first batch that passed the trusted cloud assessment, with high scores
2	Sales license (enhanced) issued by Ministry of Public Security of the People's Republic of China	Security admission certification of the Ministry of Public Security	Pass
3	Cloud Assessment Series - Elastic Computing Application Interfaces	Function assessment for cloud computing products in China and the Ministry of Industry and Information Technology (MIIT)	The first vendor that passes the assessment
4	Cloud Assessment Series - General Requirements for VM Management	Function assessment and indicator grading for cloud computing products in China and the Ministry of Industry and Information Technology (MIIT)	Pass the assessment of the highest level.
5	Cloud Assessment Series - Object-based Storage Application Interfaces	Function assessment for cloud computing products in China and the Ministry of Industry and Information Technology (MIIT)	The first vendor that passes the assessment
6	Cloud Assessment Series - Cloud Solution	Function assessment for cloud computing products in China and the Ministry of Industry and Information Technology (MIIT)	Pass
7	Cloud Assessment Series - Cloud Service	Function assessment for cloud services under MIIT	Pass

# Authoritative Consultancy Report, Test & Evaluation

Magic Quadrant for x86 Server Virtualization Infrastructure

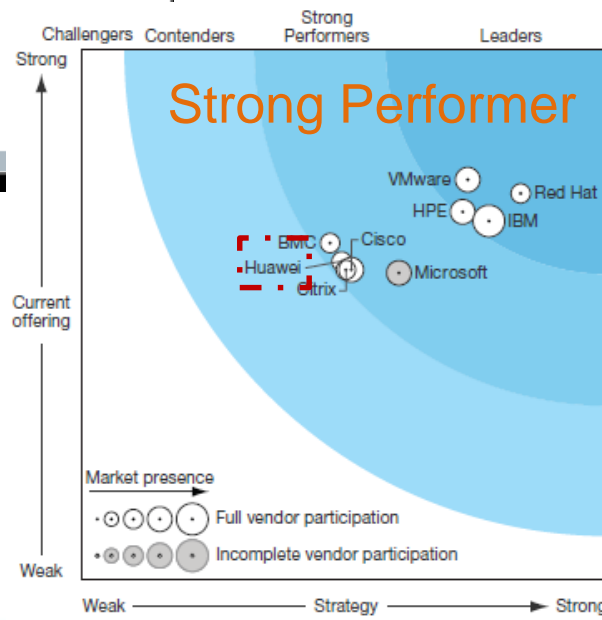


## No. 1 in SPECvirt performance benchmarking

FusionSphere sets new records for performance scores:

- Intel v1: **658.3** points
- Intel v4: **2452** points

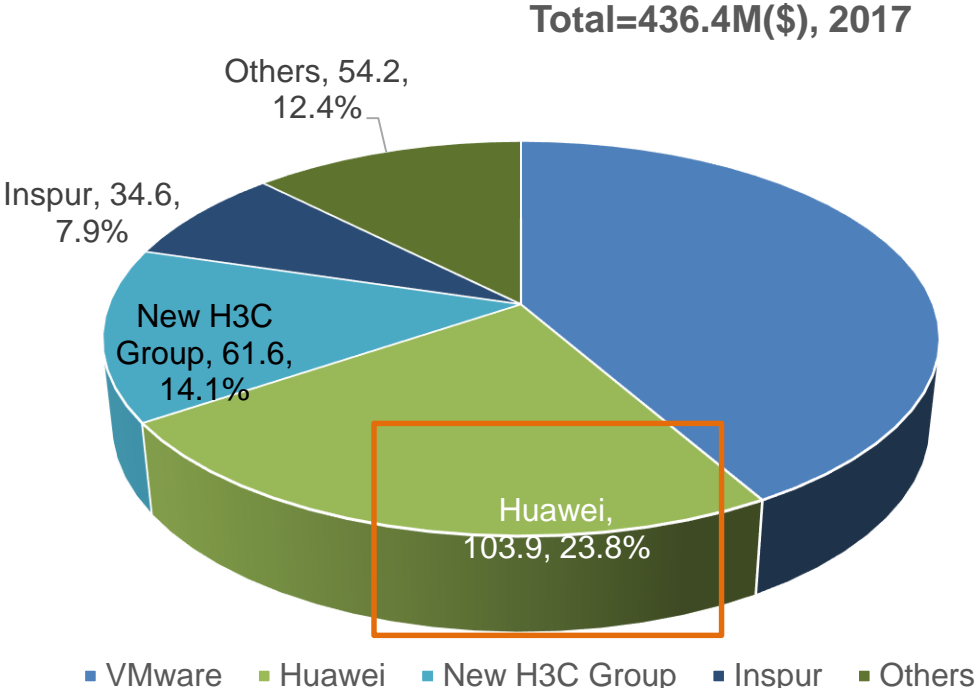
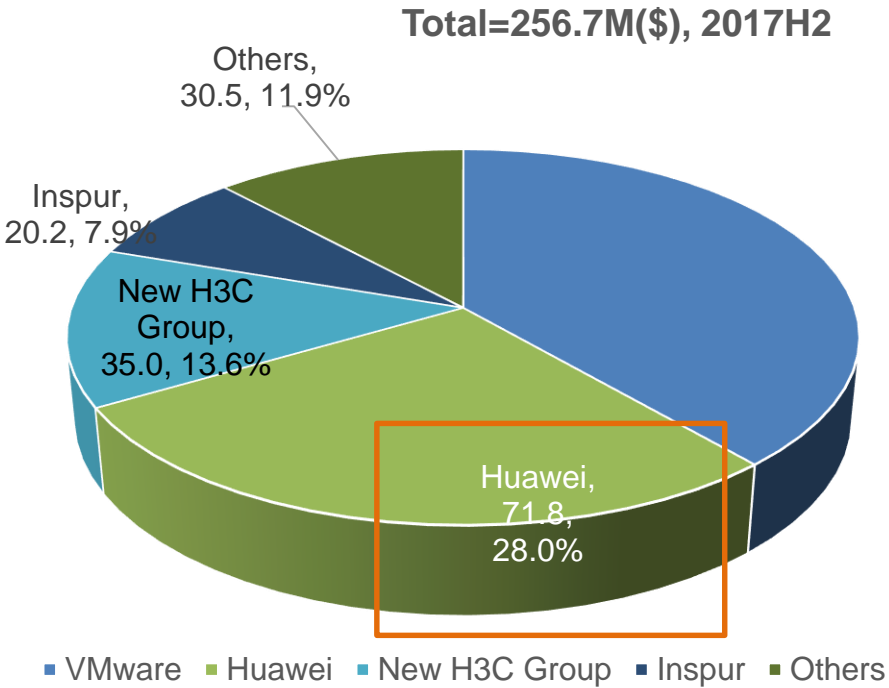
Scored 658.3 points using the Intel V1 CPU, which is 19.7 points higher than the previous highest score 638.6@37, performed well under a **7-tile** workload, setting the new industry benchmark for two-CPU servers.



Forrester Wave™: Private Cloud Software Suites

SPECvirt is one of the most recognized brands for virtualization performance certification worldwide. The test rankings are widely used by customers and vendors. FusionSphere constantly performs well in SPECvirt tests and sets new records for SPEC CPU test scores. Huawei has been working closely with Intel since 2010, releasing new SPECvirt performance test results for each newly launched Intel CPU. According to the latest releases, FusionSphere continues to lead the SPECvirt rankings on the latest Intel CPUs.

# Huawei Takes Top Spot Among Chinese Vendors

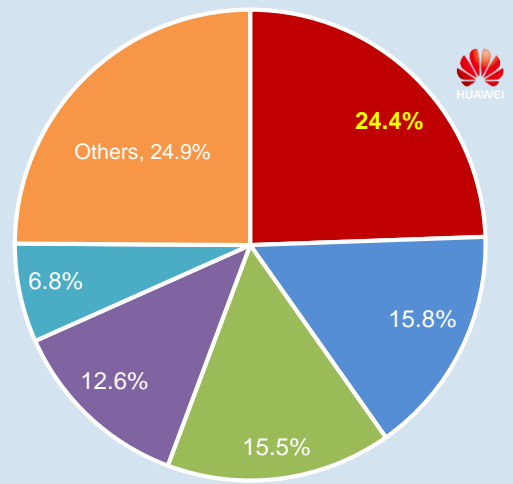


Note: IDC statistics about the global software-defined compute (SDC) market in 2017

# Excellent Global Market Performance

## China VCC Software Market No.1

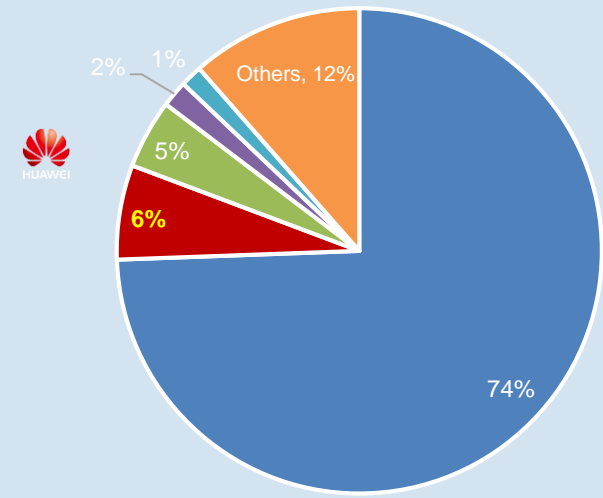
PRC VCC Software Market Share by Major Vendors, 2017



Source: IDC PRC VCC Software Tracker 2017

## WW SDC Software Market No.2

WW SDC Software Market Vendor Share, 2017H2



Source: IDC WW SDC Software Tracker 2017H2



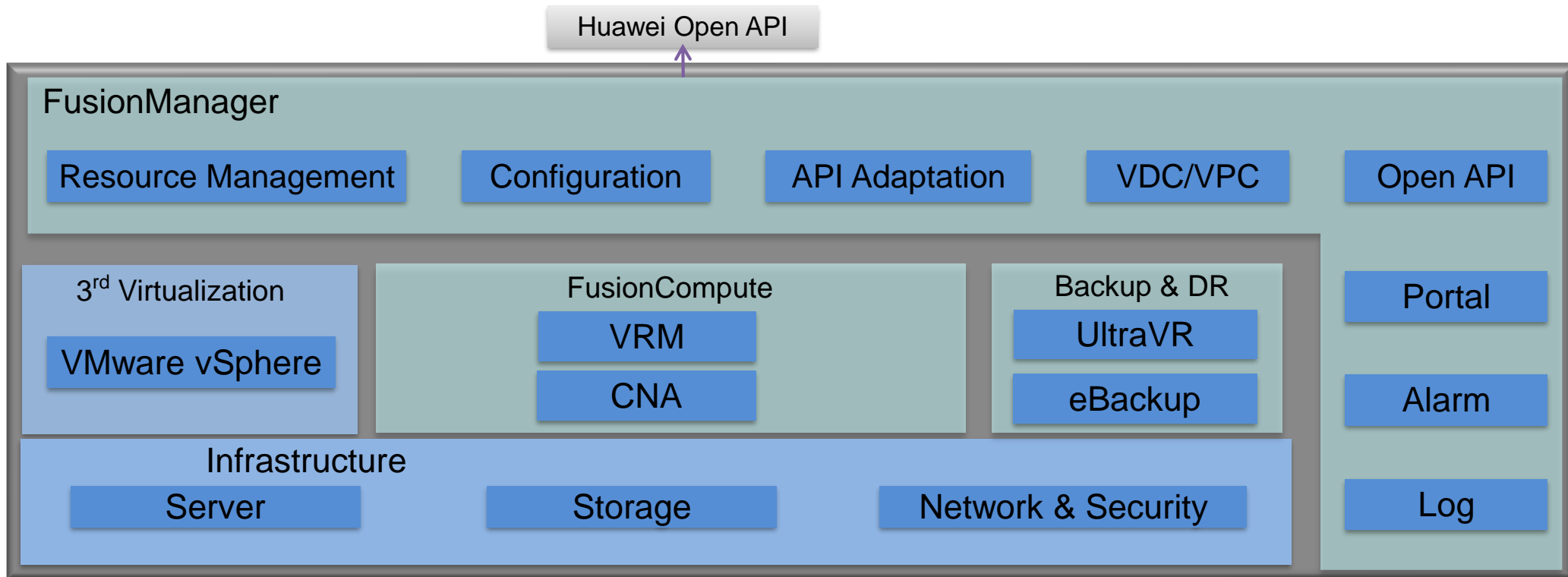
# Contents

Key Information About Huawei FusionSphere Virtualization

Introduction to Core Features of Huawei FusionSphere 6.3.1

Huawei FusionSphere Success Stories

# Huawei FusionSphere Server Virtualization Architecture



The FusionSphere virtualization solution consists of the server virtualization product (FusionCompute) and DR backup software (UltraVR and eBackup). It virtualizes hardware resources, manages virtual resources in a centralized manner, and provides basic backup, DR, lightweight operation, cloud basic services, visual infrastructure performance, and performance management.

# New Features of FusionSphere 6.3.1 Virtualization

Type	Feature Name	Description
GPU passthrough	Supports P40, M60, and P4GPU passthrough.	Enhanced
V5 server support	Supports V5 servers.	Enhanced
Support for DPDK networks	Supports the OVS+DPDK NICs.	Enhanced
SSD	Supports SSD passthrough.	Enhanced
Customizing a VM	Simplifies the customized VM template configurations.	Enhanced
GPU virtualization	Supports P40 and M60 GPU virtualization.	Enhanced
DR	The storage-based replica DR can implement 1:1 active/standby DR, 1:1 mutual DR, and N:1 shared DR between sites.	Enhanced
Antivirus	Supports Rising agent-free antivirus component.	Enhanced

# Compute Virtualization Management



## VM life cycle management

- Creation, deletion, and reclamation
- Stopping, starting, and powering off
- Pausing and resuming
- Hibernating and waking up
- Restart and forcibly restart
- Clone
- Migration, live migration across heterogeneous CPUs
- Snapshot
- Backup and restoration
- Disk migration

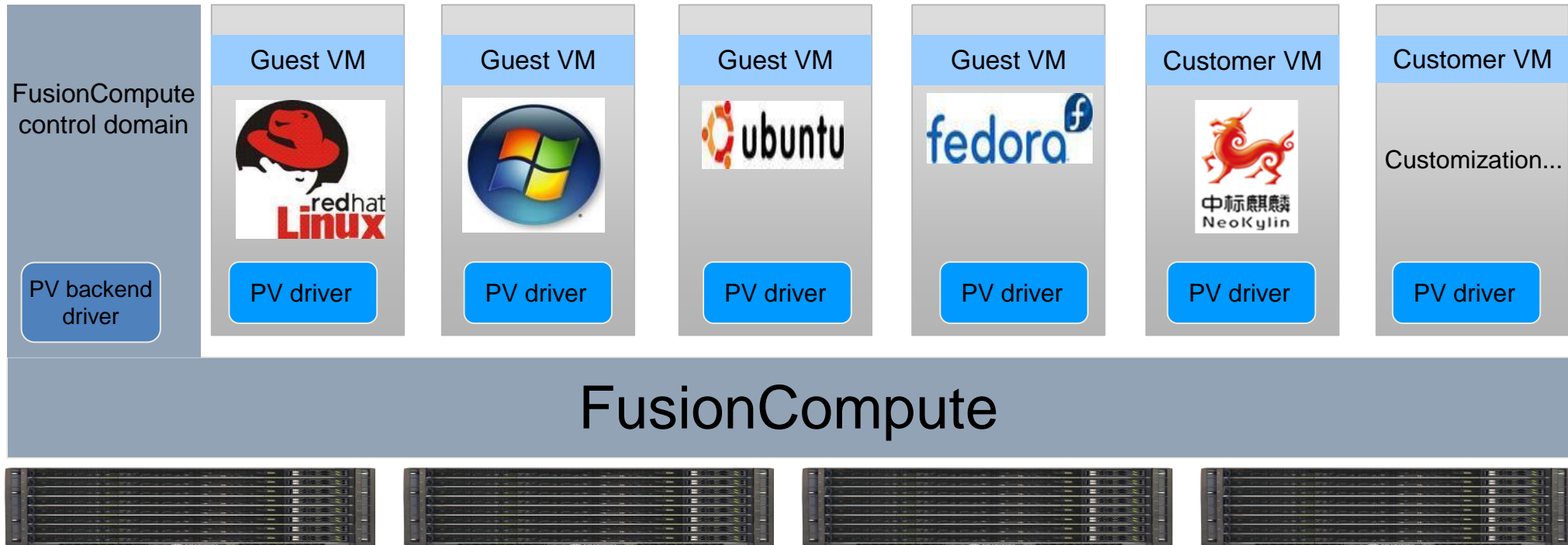
## Management of virtual resources

- Hierarchical management of data centers, clusters, hosts, and VMs
- Logical grouping and management of VM folders
- VM rights- and domain-based management
- Host group management
- Template management

## Management of virtual resource configurations

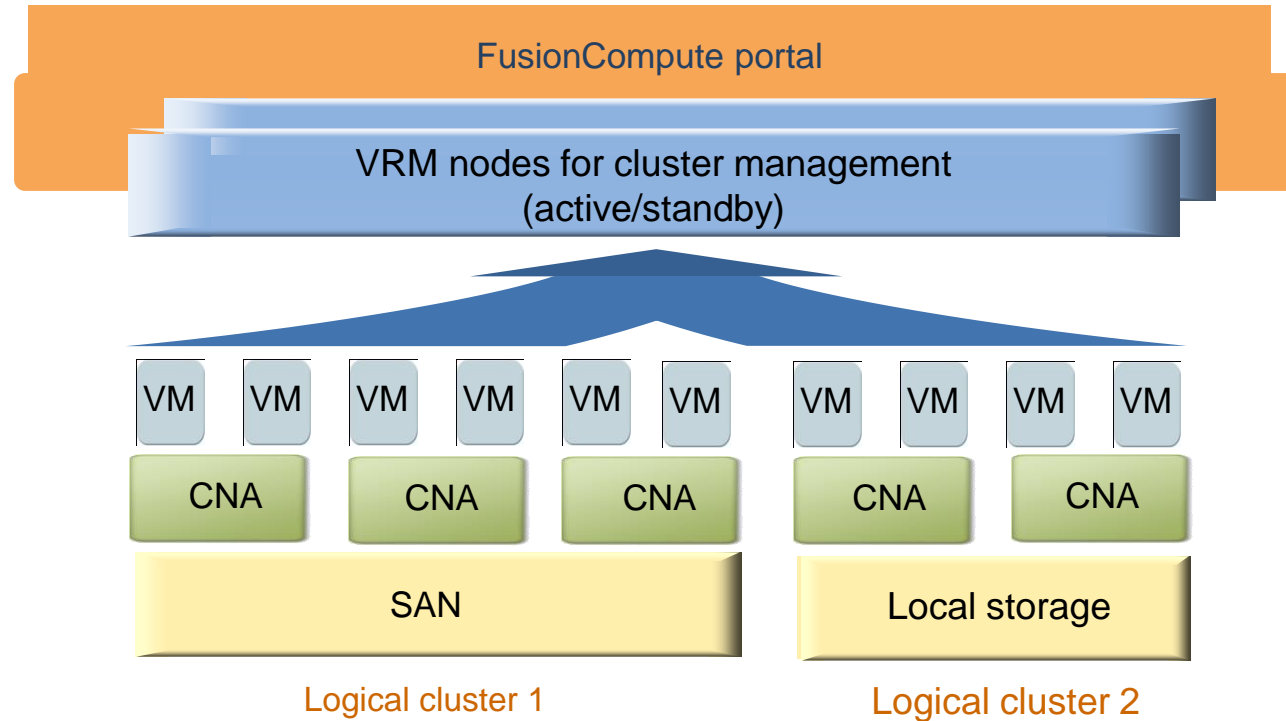
- Online and offline scaling of VM resources, including CPU, memory, disk, NIC, and peripheral devices
- GPU passthrough and SR-IOV
- VM startup policies, clock policies, and VNC keyboard management
- VM CD-ROM
- VM USB
- Memory overcommitment and QoS
- CPU overcommitment and QoS
- MUMA scheduling support

# Compatible with OSs Intended for Special Application Scenarios



To be compatible with a new OS, vendors must provide applicable PV drivers. Huawei is capable of developing applicable PV drivers. In addition to mainstream Windows and Linux OSs, FusionCompute is compatible with the NeoKylin OS. Certain OSs may need customized drivers.

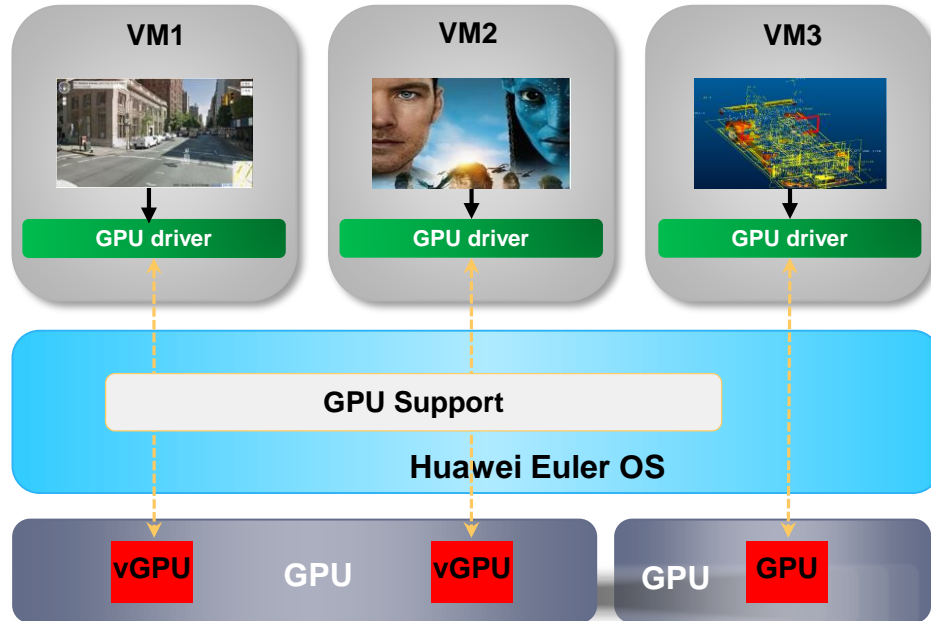
# Flexible Management and Optimal Scalability



## Technical Features & Benefits

- ✓ Each logical cluster supports up to 128 physical servers. This reduces the number of redundant physical servers and is suitable for deploying large-scale service clusters requiring high performance.
- ✓ Each logical cluster supports up to 8,000 VMs, which makes FusionSphere applicable to scenarios requiring a large number of VMs that do not have high performance requirements, such as in desktop cloud scenarios.
- ✓ VRM nodes can be deployed in active/standby mode on both physical servers and VMs to ensure system availability.

# GPU Virtualization & GPU Passthrough



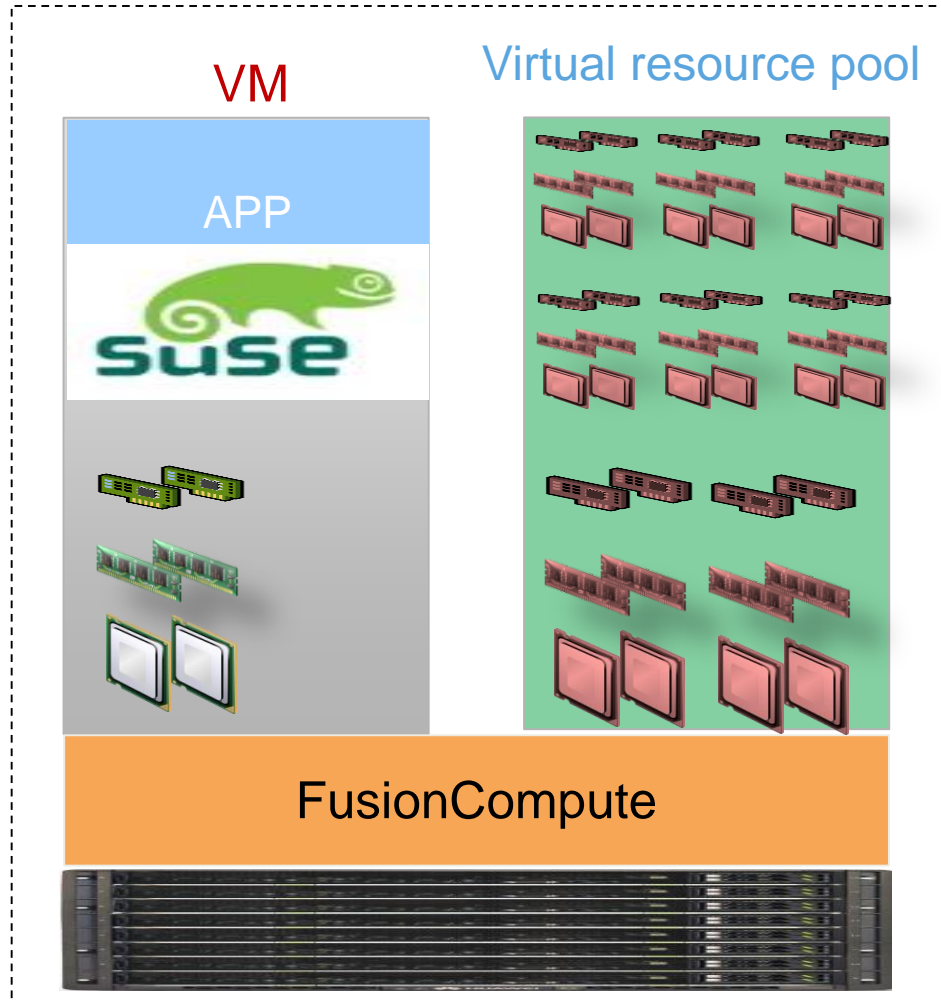
## Application Scenarios

- ✓ Applications such as mechanical design software (ProE, Catia, AutoCAD), media creation tool, 3D game, and GIS in a virtualized environment
- ✓ Industrial design, multimedia editing, energy, financial services and trade, medical imaging system, education, etc.
- ✓ To improve the performance of demanding graphics and imaging applications running in a virtualized environment

## Key Technologies and Features

- ✓ VMs can be bound to GPUs to directly access partial GPU resources.
- ✓ NVIDIA GRID handles GPU virtualization, improving the experience of graphics applications.
- ✓ vGPU resource management and scheduling enable GPU load balancing.
- ✓ Supported multimedia programming interfaces: OpenGL and DirectX
- ✓ Supported features: Aero special effect, multi-monitor, and DirectX Video Acceleration (DXVA)

# Online CPU and Memory Modification



## Technical Principles

- ✓ vRAM and vCPUs: online and offline adding, and offline deletion

## Technical Features

- ✓ Allows users to modify CPUs and memory sizes for a running VM. New settings take effect without VM restart.

## Application Scenarios

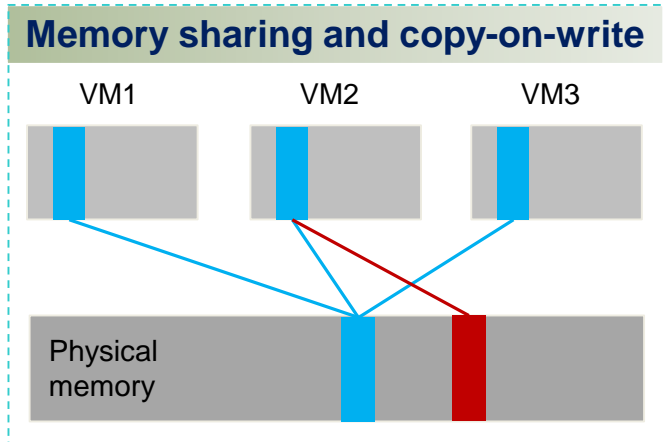
- ✓ The number of vCPUs on a VM and the VM memory size need to be flexibly adjusted based on service requirements.

## Benefits

- ✓ Flexibly adjusts VM configurations based on service requirements.
- ✓ Vertical expansion ensures QoS of a VM.
- ✓ Integrates with horizontal expansion to ensure cluster QoS.

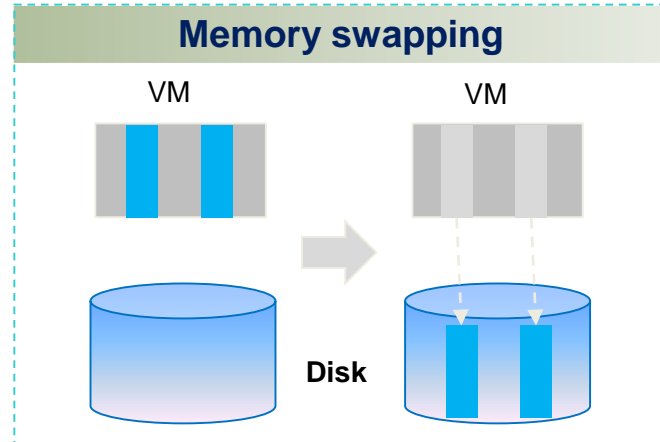


# Memory Overcommitment, Improving VM Density by 50%

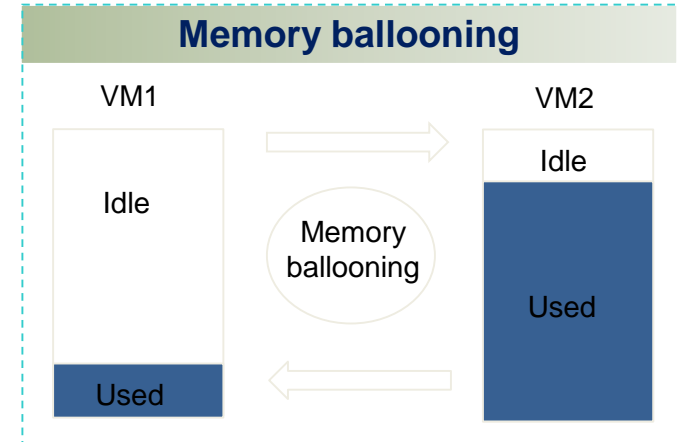


**Memory sharing:** Multiple VMs share the same physical memory block (marked in blue), and the VMs only read data from the memory block.

**Copy-on-write:** When a VM needs to write data to its memory block, another memory block (marked in red) is allocated to the VM to write the data and the mapping between the allocated block and the VM is created.



**Memory swapping:** The memory data that is not retrieved by the VM for a long time is swapped to a disk, and a mapping between the memory data and the disk is created. When the VM needs to access the memory data again, the memory data is swapped out from the disk back to the memory block.



**Memory ballooning:** The hypervisor uses the memory ballooning mechanism to release the idle memory on a VM and allocate the memory to another VM with high memory usage, thereby improving memory utilization.

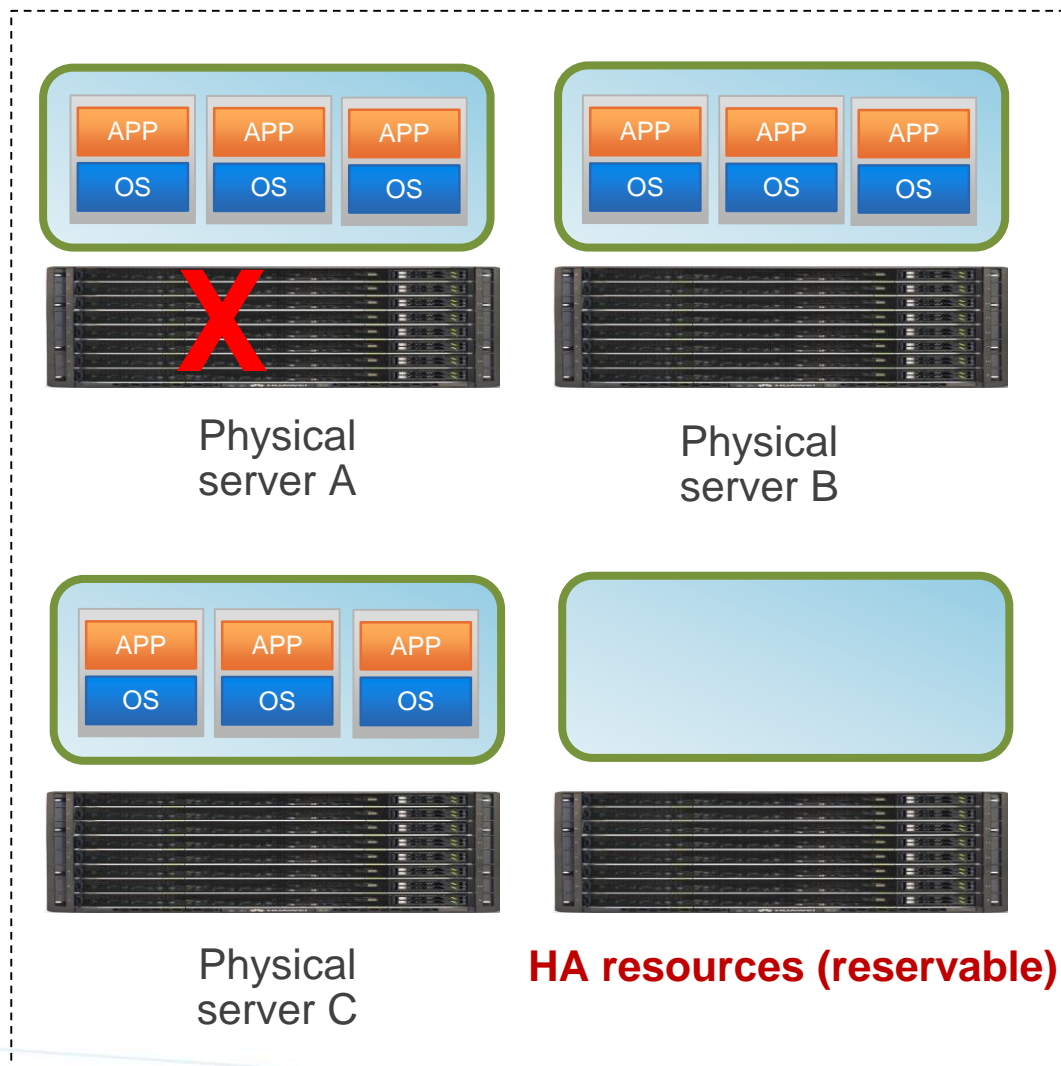
## Technical features

- ✓ By leveraging the preceding memory overcommitment techniques, Huawei FusionSphere increases the memory overcommitment ratio by 150%, which makes Huawei overtake its competitors in terms of memory utilization, such as Citrix.

## Benefits

- ✓ With the same memory resources, the VM density of the FusionSphere platform increases by 150%, which helps to reduce procurement costs on memory components by 50%.

# VM HA



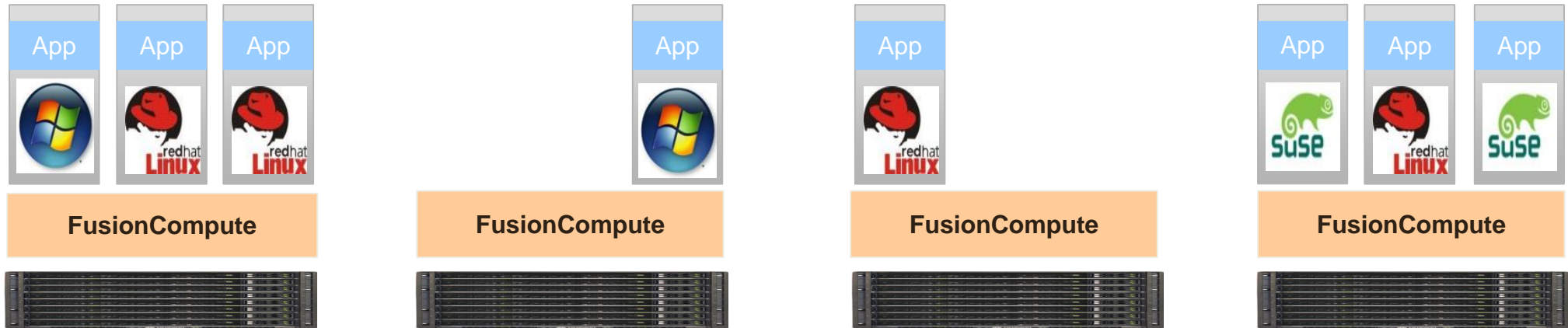
## Application Scenarios

- ✓ When a host becomes faulty, VMs on the faulty host immediately start on another host, ensuring service continuity.

## Key Technologies and Features

- ✓ Detects various faults of hosts, virtual platforms, and VMs, and restore VMs.
- ✓ Supports multiple cluster HA policies, to ensure VM restoration success rate and provide pre-warning for the VM restoration capacity of clusters.
- ✓ Supports VM HA using shared storage and local storage.
- ✓ Greatly speeds up fault rectification and reduces service downtime, ensuring service continuity and enabling self-healing to a certain degree.

# DRS



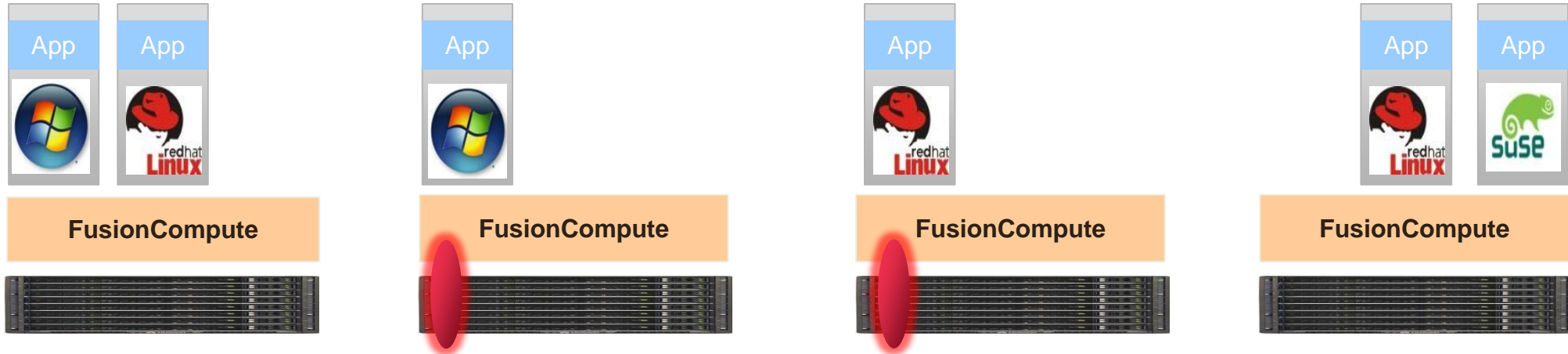
## Application Scenarios

- ✓ Scenario: where the VM service load has lasting peaks and troughs and stable performance is needed to ensure consistent user experience
- ✓ Host resource usage is balanced through DRS, maximizing utilization of each host's compute capacities and improving the efficiency of service systems running on VMs.

## Key Technologies and Features

- ✓ Automated VM load balancing within each cluster based on scheduling policies
- ✓ An appropriate scheduling algorithm that takes the VM load change into consideration, preventing over-frequent VM migration between hosts
- ✓ A unique schedule baseline configuration to avoid unnecessary VM migration
- ✓ No scheduling or manual scheduling for VMs that have special performance requirements
- ✓ Administrators can manually schedule resources or enable automated scheduling by configuring scheduling policies.
- ✓ Supports scheduling policies that are on a daily, weekly, or monthly basis, or based on accurate time periods.

# DPM



## Application Scenarios

- ✓ Scenario: where the VM service load has lasting peaks and troughs and the customer needs to reduce power consumption
- ✓ While reserving sufficient resources to ensure service continuity, during off-peak hours, migrate VMs to concentrate them on a smaller number of hosts and power off the rest hosts, reducing power consumption. During peak hours, power on all hosts to ensure VM performance and service experience.

## Key Technologies and Features

- ✓ The system migrates VMs on light-load hosts to other hosts and powers off the idle hosts based on the DPM policy. If the load of some hosts exceeds the configured threshold, the system powers on a certain number of hosts again to ensure load balancing among hosts based on predefined policies.
- ✓ Automatically powers on or powers off one or multiple hosts.
- ✓ Considers the mutual impacts of DPM and DRS.
- ✓ Supports scheduling policies that are on a daily, weekly, or monthly basis, or based on accurate time periods.

# Storage Virtualization Management



## Compatible storage types

- SAN (Storage Area Network)
- NAS (Network Attached Storage)
- FusionStorage Block storage pools
- Local host hard disks
- Local host RAM disks

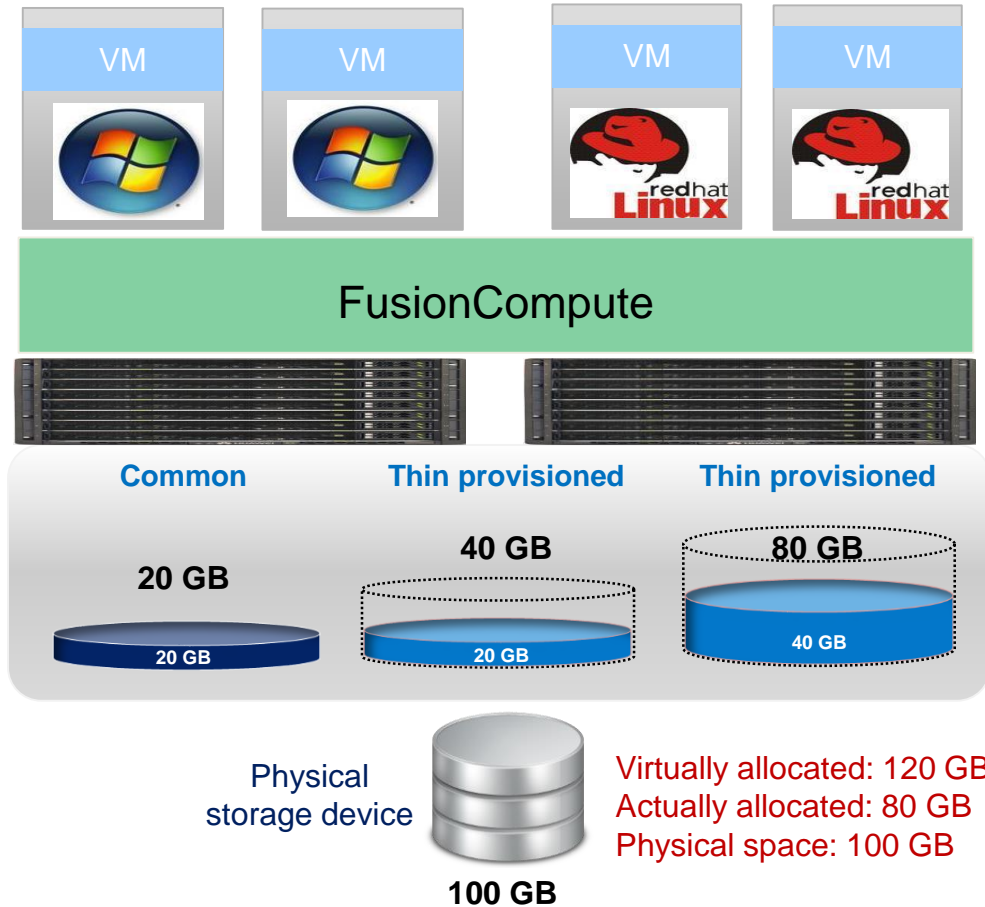
## Storage resource capacities

- Thin provisioning disks
- Thick provision lazy zeroed disks
- Incremental snapshots
- Storage cold and live migration
- Scaling of virtual disks
- Management of disk snapshots

## Management of storage configurations

- Storage resource discovery and management
- Data store creation and management
- Raw device mapping (RDM)

# Thin Provisioning, Cutting Storage Investments



## Technical Principles

- ✓ VRM delivers only storage space required for storing data and does not deliver allocated storage space that is not used. Instead, VRM increases the amount of delivered storage space with the increase of the data amount on the disk.

## Technical Features

- ✓ The configured capacity is displayed for VM users. However, the allocated disk space is dynamically adjusted based on actual usage.
- ✓ Capacity monitoring: supports data storage capacity pre-warnings
- ✓ Disk space reclaiming: supports disk space monitoring and reclaiming

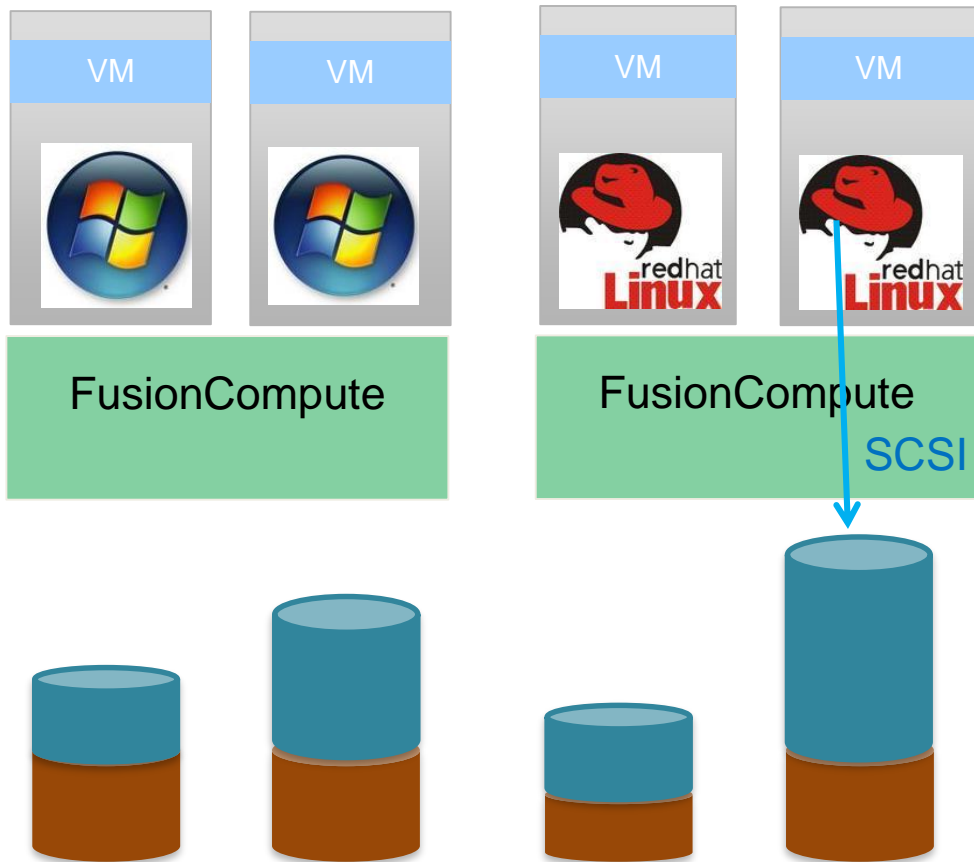
## Application Scenarios

- ✓ Large storage capacity and low IOPS requirements

## Benefits

- ✓ Improves storage space utilization and lowers storage costs.

# Online Virtual Disk Capacity Expansion



## Technical Principles

- ✓ Enables you to expand disk capacity without stopping or restarting the VM.

## Technical Features

- ✓ This function is based on RAW (RAW Image Format) virtual disk.
- ✓ No Windows VM restart is required during the virtual volume capacity expansion

## Application Scenarios

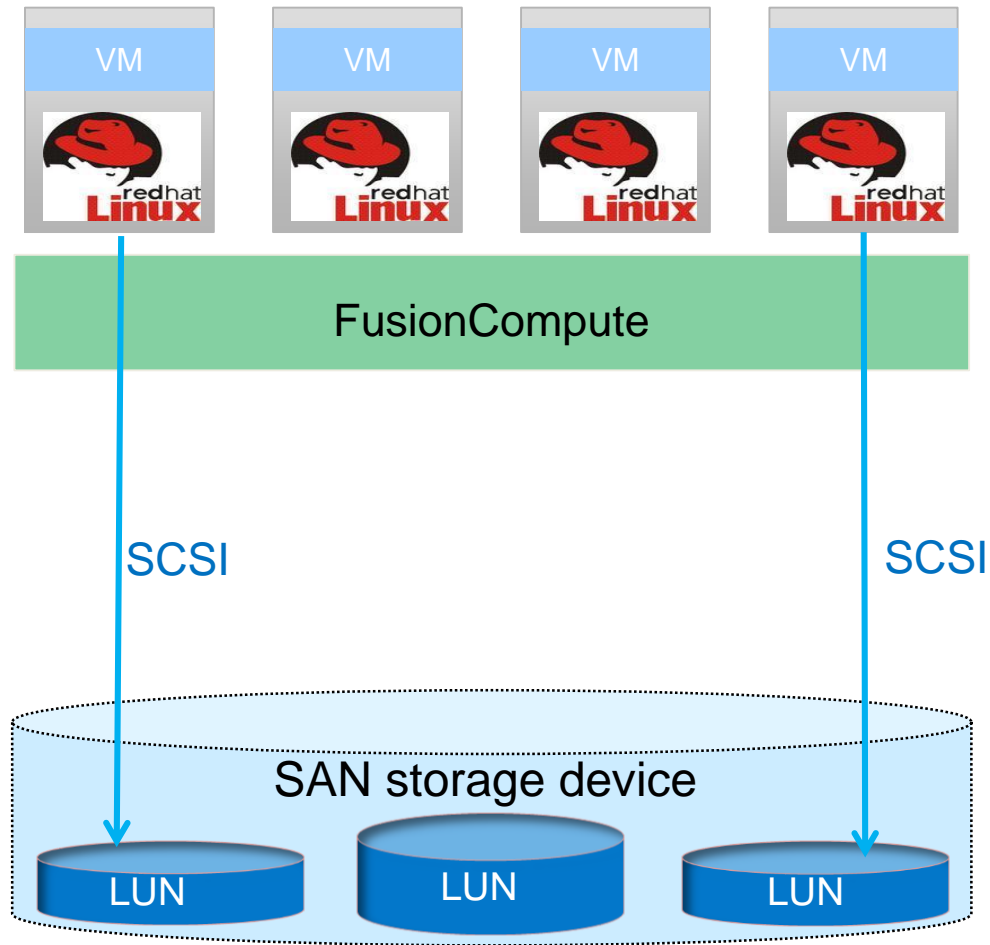
- ✓ On-demand, scalable disk capacity expansion is required.

## Benefits

- ✓ Virtual disk space can be expanded without VM stop.



# RDM for Storage Resources



## Technical Principles

- ✓ RDM provides a mechanism for a VM to have direct access to a LUN on IP SAN or FC SAN devices (using fiber channel or iSCSI only). RDM enables VMs to identify SCSI disks.

## Technical Features

- ✓ VMs can perform operations on raw storage devices through SCSI commands.
- ✓ Supports both IP SAN and FC SAN devices.

## Application Scenarios

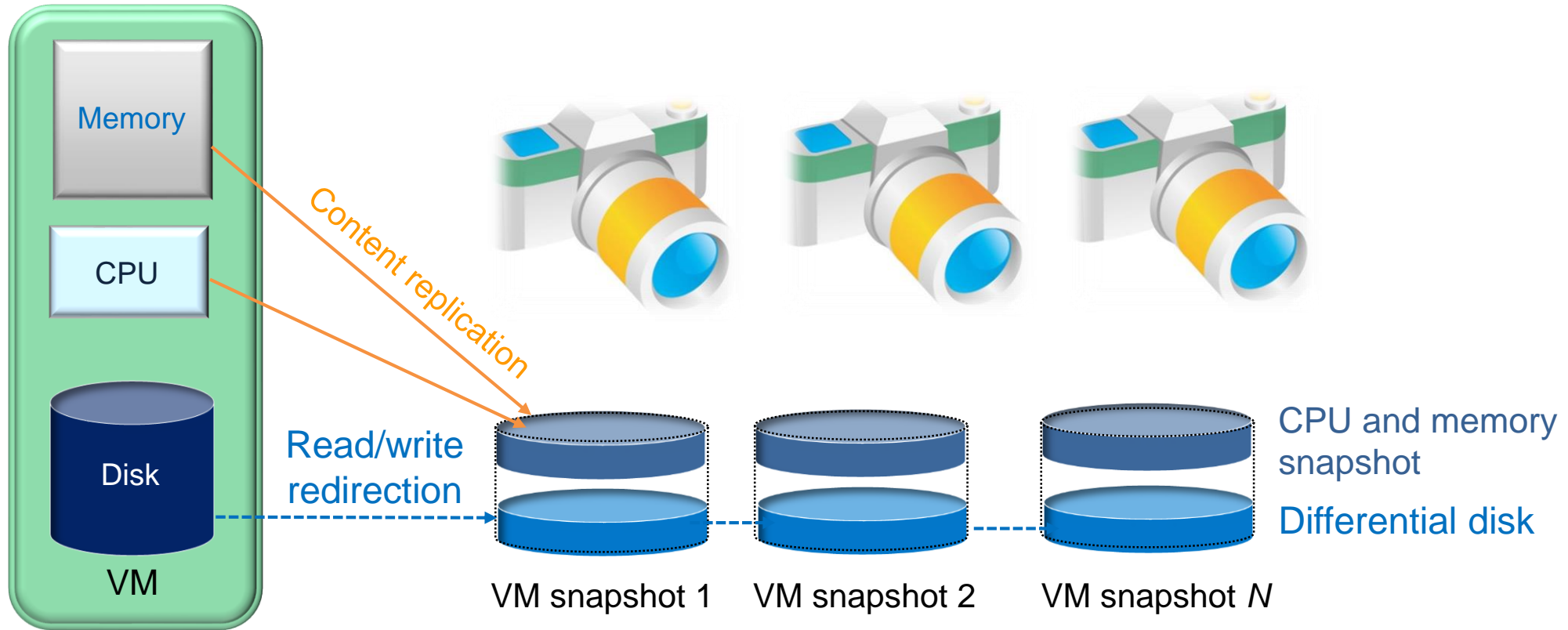
- ✓ Applications requiring high storage performance, such as Oracle RAC

## Benefits

- ✓ RDM enables applications requiring high storage performance to be deployed on VMs.



# VM Snapshot



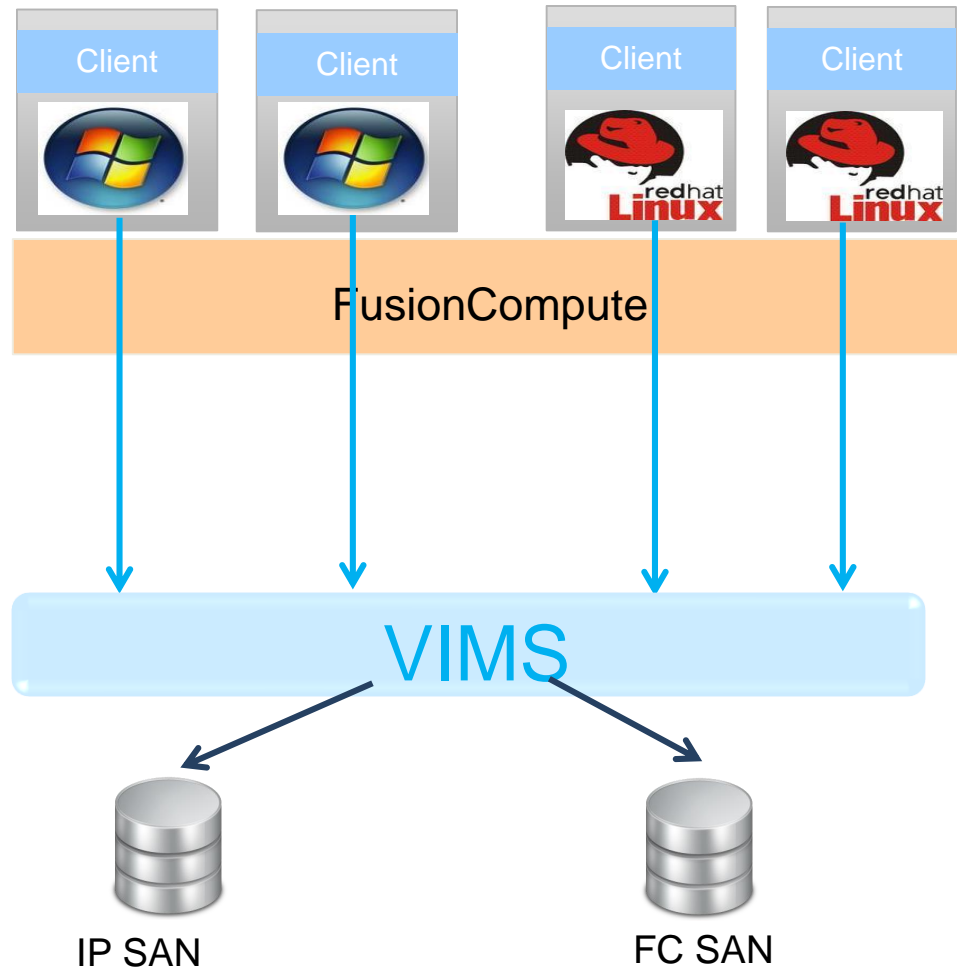
## ◆ Technical Features

- Incremental and memory snapshots store all information about a VM.
- Backup can be created for a running VM.
- Snapshots can be used to restore any VM.
- Snapshots of running VMs can be merged.

## ◆ Application Scenarios

- VM data backup and recovery

# VIMS



## Application Scenarios

Advanced storage features, including storage migration, snapshot, and linked clone, are needed.

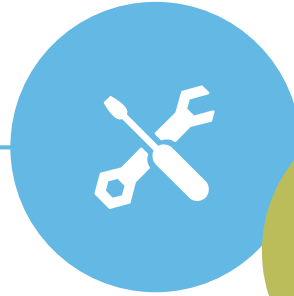
## Customer Pain Points & Needs

- Complex management, low management efficiency, error prone
- Incompatibility with heterogeneous devices

## Key Technologies and Features

- Virtual image management system (VIMS) is a high-performance cluster file system that converts data stores to into VIMS format and then attaches them to CNA nodes.
- Is compatible with FC SAN and IP SAN.
- Supports fixed disk sizes, dynamically scalable disks, and differential disks.

# Network Virtualization Management



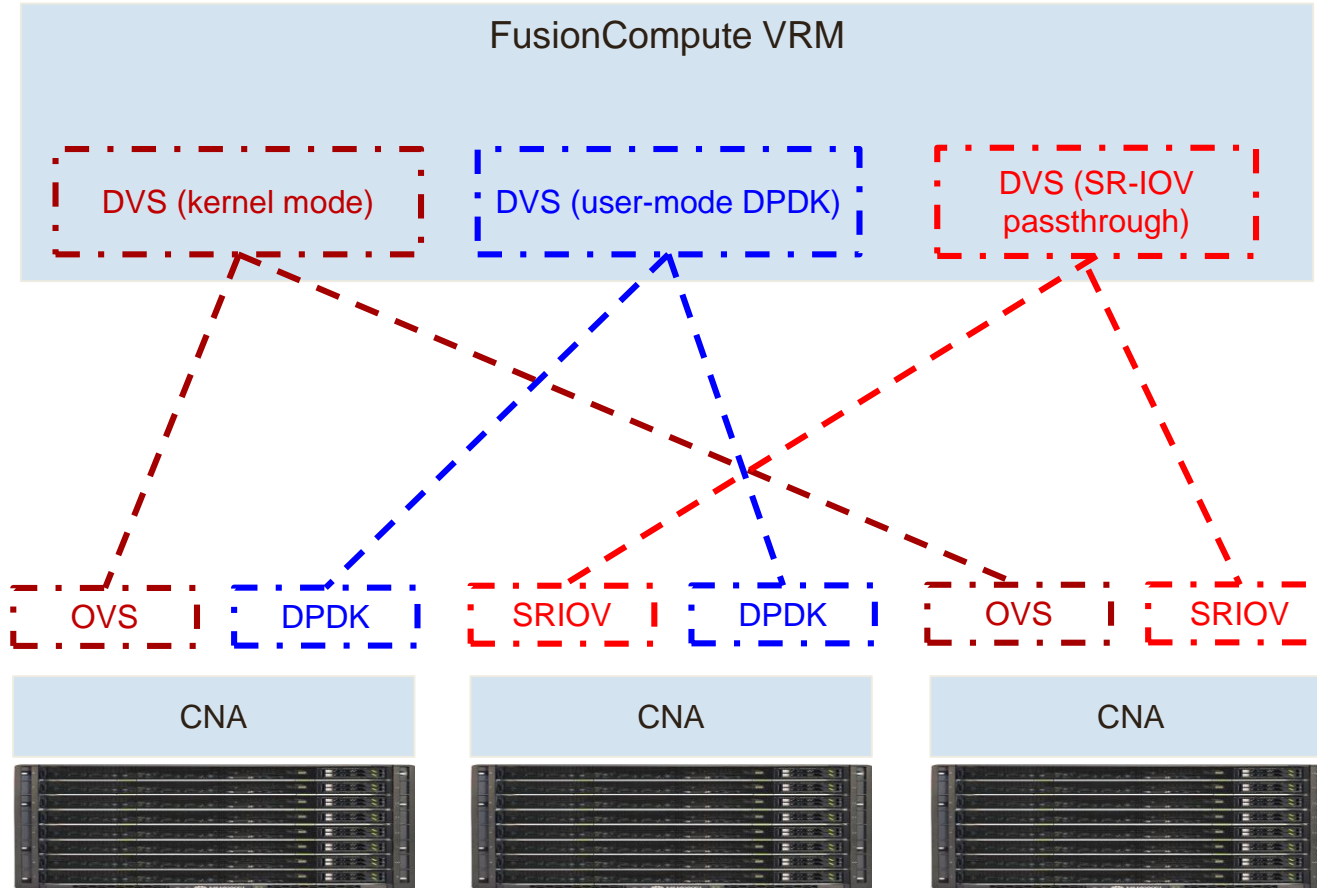
## Managed network resources

- Virtual switch
- Virtual NIC (vNIC)
- Port group
- Uplink
- VLAN

## Virtual network capabilities

- IP-MAC binding
- Filling in the TCP checksum
- VLAN trunk
- QoS
- SR-IOV
- DPDK
- Traffic shaping
- ARP broadcast suppression
- DHCP isolation
- Link Aggregation Control Protocol (LACP)

# Network Virtualization: Unified Management Of SR-IOV Passthrough and DPDK



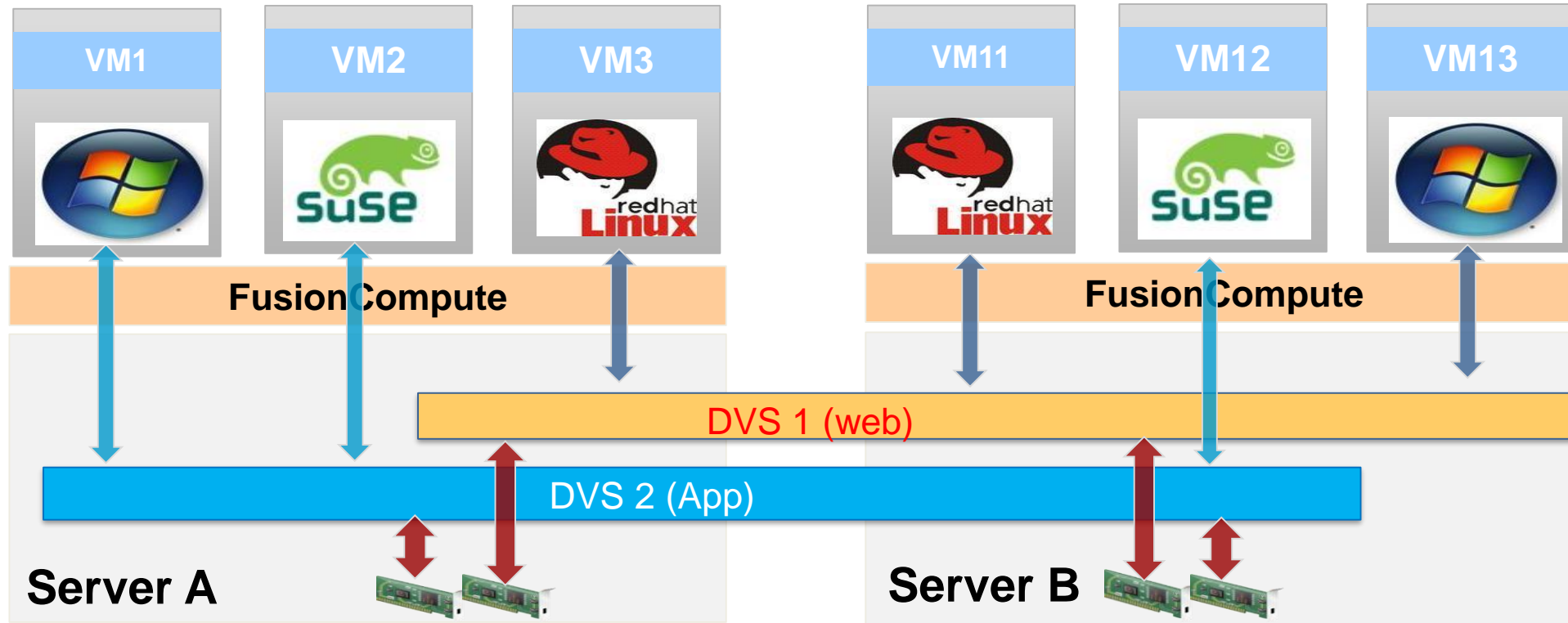
## Application Scenarios

- ✓ To provide high bandwidths for internal interconnect between VMs and support high-I/O services

## Key Technologies and Features

- ✓ Supports life cycle management of distributed switches based on DPDK.
- ✓ Supports DPDK-based distributed virtual switches, VLAN trunk and rate limiting on virtual NICs.
- ✓ Supports unified management of kernel-mode, SR-IOV passthrough, and DPDK-based DVSs.
- ✓ With the TN-V model, the bandwidth of a DPDK-based DVS can reach 6.2 Mpps@64B (vs 1 Mpps@64B for kernel-mode).
- ✓ With a 40GE NIC, a physical server supports at least 20 Gbit/s bandwidth for virtual network ports after being virtualized, achieving second-level video transmission.

# Distributed Virtual Switch



## Technical Principles

Administrators can configure and maintain the physical and virtual ports of virtual switches connected to multiple hosts.

## Technical Features

- ✓ A centralized management UI portal is provided so users can easily understand the network structure.
- ✓ Supports VLAN, Layer-2 security policy, and bandwidth control.

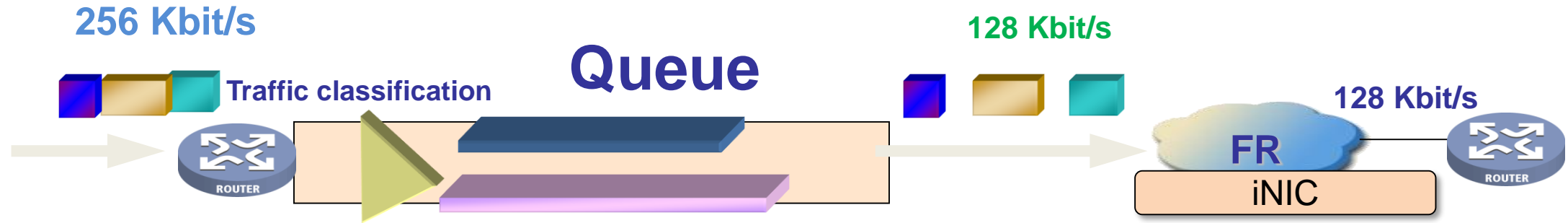
## Application Scenarios

Scenarios that use a large number of hosts and need centralized management of the virtual switching network

## Benefits

More flexible network policy control

# VM Network QoS Control



## Technical Principles

- ✓ Network QoS provides traffic shaping and bandwidth priority control for virtual NICs.

## Technical Features

- ✓ QoS control can be implemented for both inbound and outbound traffic.

## Application Scenarios

- ✓ High-quality network communication between the network plane and user VM network is required.

## Benefits

- ✓ QoS control on inbound traffic avoids resource contention and ensures traffic fairness.
- ✓ Traffic shaping can be implemented for outbound traffic. The burst size and average bandwidth can be configured to allow a burst when the system has a lot of idle resources. In addition, traffic shaping avoids the packages loss, network jitter, and impact on services caused by rate limiting.

# O&M — FusionCare: Health Check and Log Collection System

The screenshot displays the FusionCare Health Check interface. The top navigation bar includes 'Health Check', 'Info Collection', and 'System Management'. The main area is titled 'Create Health Check Task' and features a progress bar with four steps: 'Select a Task Type', 'Select Nodes', 'View Node Status', and 'Select Check Items'. Below the progress bar is a table of check items with columns for 'Product Type', 'Node Type', 'Check Item ID', 'Check Item Name', and 'Check Item Type'. The table lists various FusionCompute VRM check items, including 'VRM License Information', 'OM Alarm', 'VRM Hard Disk Partition Usage', 'Status of the Active and Standby VRM Nodes', 'Memory Usage of Important Processes on the VRM', 'VRM Data Backup Mechanism', 'VRM Dual-Host Standby Configuration File', 'VRM Management-Plane Floating IP Address Status', and 'VRM File Permission'. Buttons for 'Previous', 'Finish', and 'Cancel' are at the bottom.

The second screenshot shows the 'Current Environment Check Result' page. It includes a 'Start Time' of 2019-04-23 17:11:46 and an 'End Time' of 2019-04-23 17:14:41. A 'Pass rate' section features a donut chart showing 85.7% OK (green), 14.3% Failure (red), 0% Info (orange), and 0% Error (grey). Below the chart is a table of check results with columns for 'Environment Name', 'Check Item ID', 'Item Name', 'Check Result', 'Node Detail', and 'Result Details'. The table shows results for various check items, with one 'Failure' result for 'Check whether the MongoDB is independent mount.' and several 'OK' results for other items.

## Application Scenarios

- ✓ FusionCare is an O&M tool used for routine health check and log collection for FusionSphere systems.

## Key Technologies and Features

- ✓ Checks the health status of key processes, configuration files, hardware, and other items of each node.
- ✓ Supports configuration of routine check and in-depth check.
- ✓ Allows users to check the possible causes, troubleshooting guidelines, and handling procedure for each non-compliant item.
- ✓ Collects information and logs of each node, including the logs of OSs, modules, scripts.

## Technical Specifications

- ✓ Collects information about all FusionSphere components and nodes.

# O&M — Wizard-guided Installation and Upgrade Tool

## Application Scenarios

- ✓ System installation and deployment
- ✓ System upgrade
- ✓ Upgrade of VM PV drivers

## Customer Pain Points

- ✓ Complex system installation and configuration, poor visibility of overall installation progress
- ✓ Manual installation of nodes one by one, low efficiency
- ✓ Separate execution of system upgrade check, low efficiency
- ✓ Inconsistent upgrade procedures for different components, complex upgrade operations
- ✓ Poor visibility of upgrade progress and reporting

The screenshot displays the 'UpdateTool' web interface. At the top, there is a navigation bar with 'Update Management' and 'System Management' tabs, along with utility links for '中文简体', 'Export Logs', 'Upgrade Report', and 'Help'. Below the navigation bar, there are three main buttons: 'Create Upgrade Project', 'Create Hot Patch Project', and 'Collect Information'. The main content area is titled 'Supported Browsers' and includes a compatibility notice: 'The tool is only compatible with Internet Explorer 9.0 to 11.0 (recommended), Mozilla Firefox 26 or later, and Google Chrome 31.0 or later. However, the tool does not support the Compatibility View mode of Internet Explorer. The recommended screen resolution is 1024x768 pixels.' Below this, there are two tabs: 'Upgrade Process Guidelines' and 'Hot Patch Process Guidelines'. The 'Upgrade process' section features a horizontal flow diagram with five steps: 'Create Project', 'Distribute Software Package', 'Upgrade Check', 'Upgrade', and 'Submit Project'. Each step is accompanied by a numbered list of instructions: 1. Create Project (Create a new upgrade project and save the upgrade configuration information about the target node. The configuration information includes: Service system login information, Management node OS login information, Upgrade or patch software package information); 2. Distribute Software Package (Distribute the required upgrade or patch software package to the target node); 3. Upgrade Check (Check whether the target node meets upgrade requirements); 4. Upgrade (Perform the upgrade operations. If a node fails to be upgraded, roll back the node. If the rollback is successful and the previous upgrade failure is rectified, you can start the upgrade again.); 5. Submit Project (Submit the current upgrade project. After this operation, submitted nodes can not be rolled back, and data about these nodes, such as the software package, will be deleted to release resources.). A note at the bottom states: 'Do not distribute the software package to, perform the upgrade check for, or upgrade or roll back more than 100 nodes concurrently. For details about the upgrade procedure, see [Help](#).'

## Key Technologies and Features

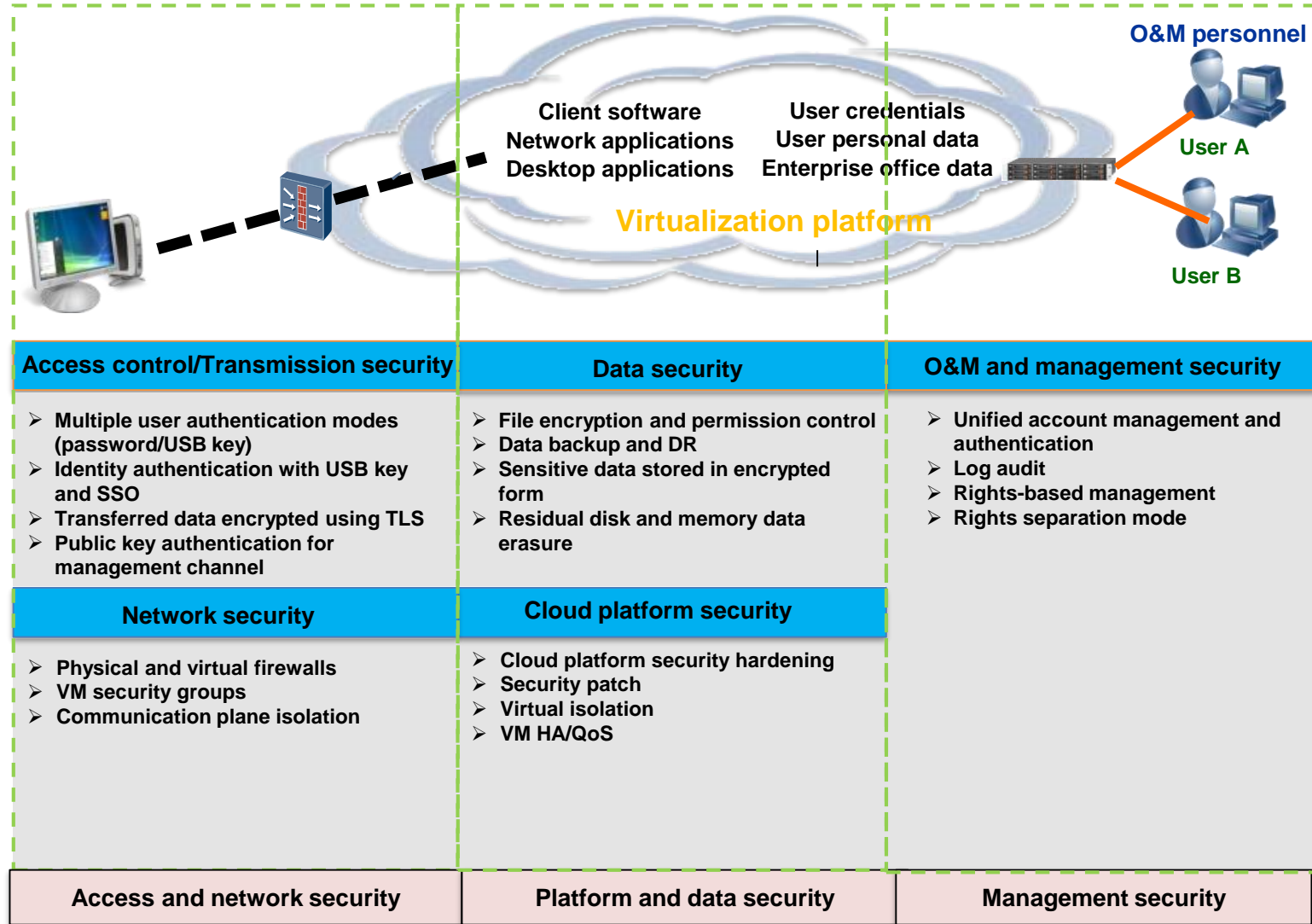
- ✓ Wizard-guided installation, good visibility of installation progress
- ✓ One tool for the installation and deployment of all management nodes and hosts in FusionSphere
- ✓ Batch deployment and installation operations, high efficiency

## Capability Specifications

- ✓ Able to deploy 50+ nodes in one batch.
- ✓ In typical deployment, all components can be installed through 12 steps within 3 hours.



# Security — Holistic Security Solutions



1. Service continuity

2. Tenant isolation

3. Data security

4. Infrastructure security

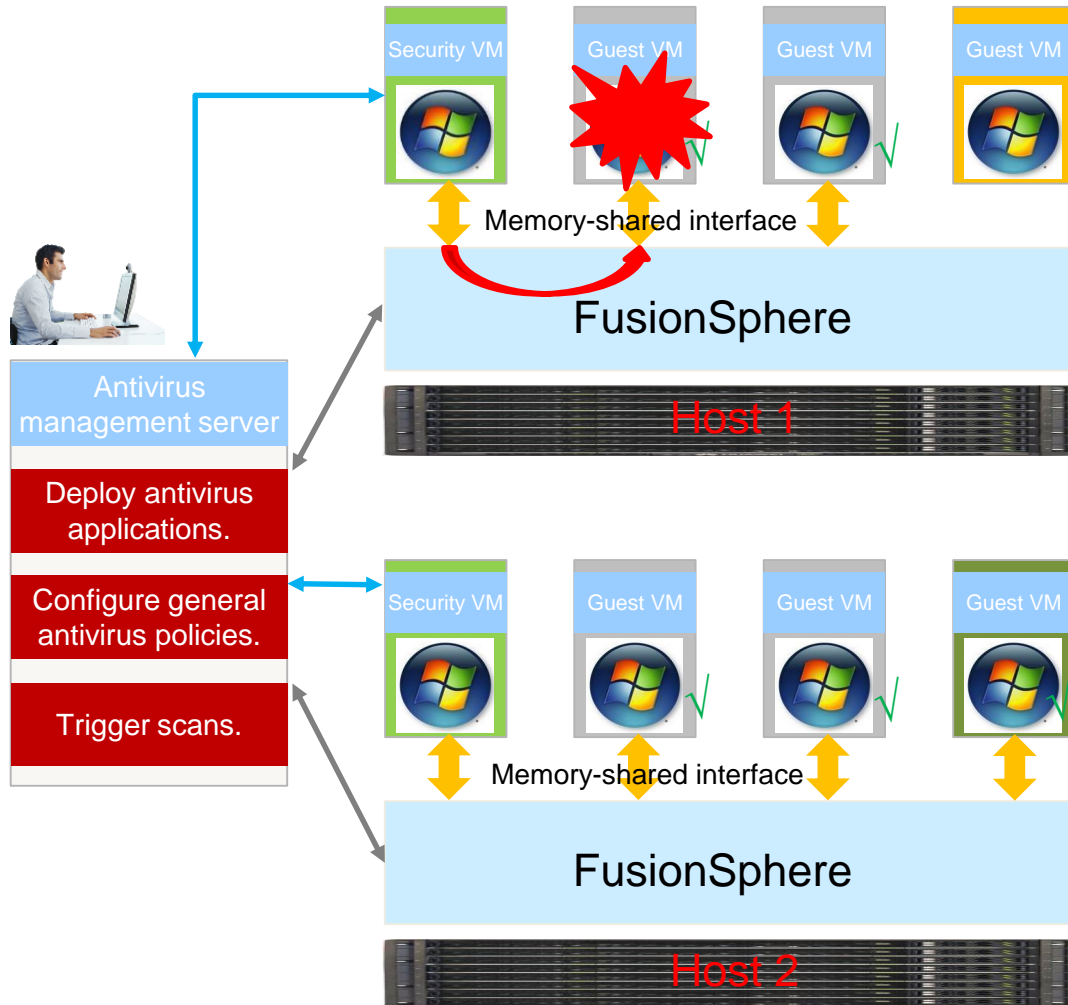
5. Security O&M

6. Resource SLA

7. Security services

A holistic approach to security, covering access, network, platform, data, and management, to meet various security demands

# User Security — Antivirus Virtualization



## Main Principles

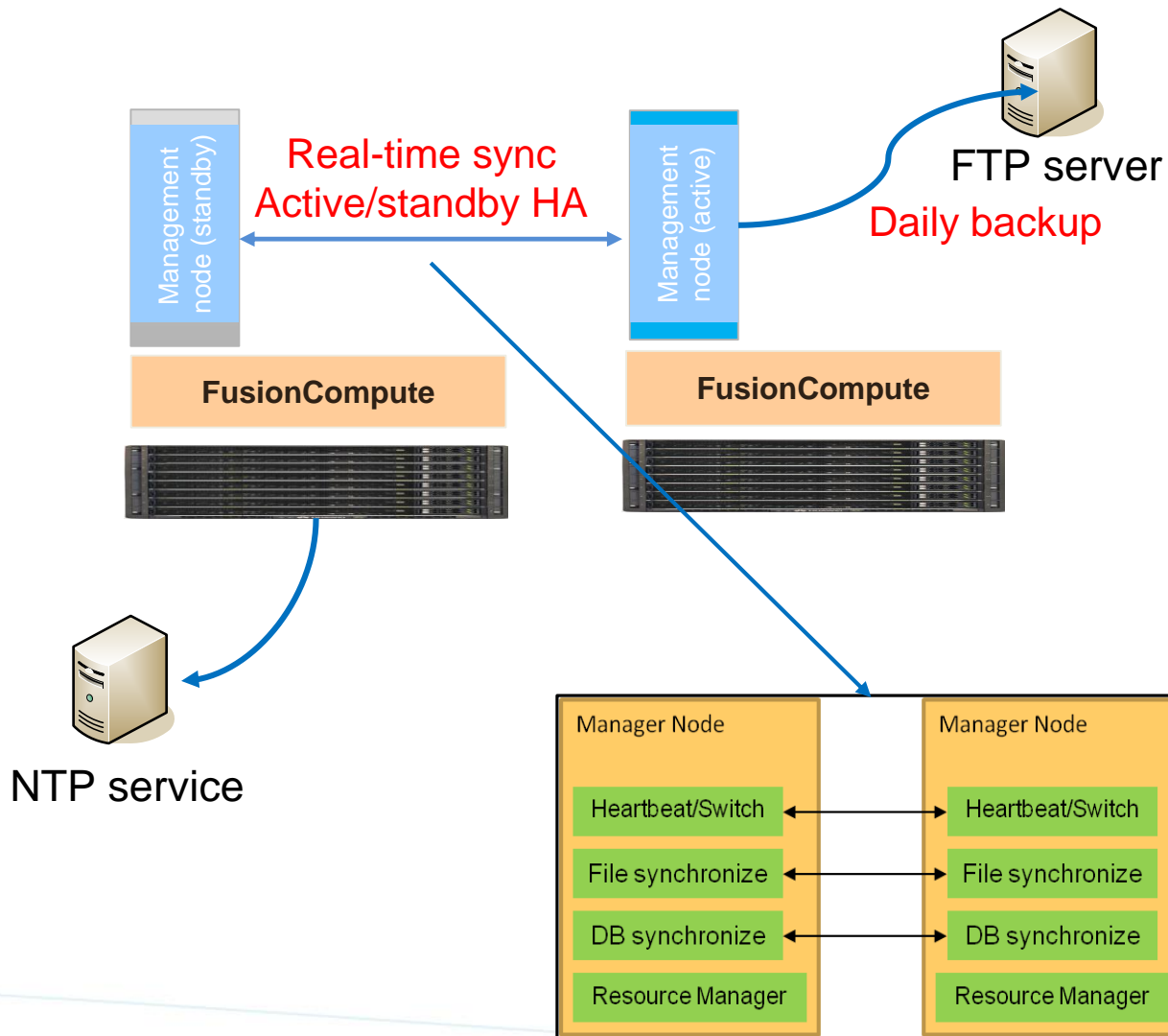
Huawei FusionSphere provides open antivirus APIs for vendors to develop antivirus solutions.

## Technical Characteristics and Benefits

- World-leading agentless antivirus virtualization mode
- Gene + decision-making engine
- Intuitive visualization of security conditions
- High reliability
- Comprehensive virus log statistics and analytical functions
- Precise and efficient file monitoring



# System Reliability



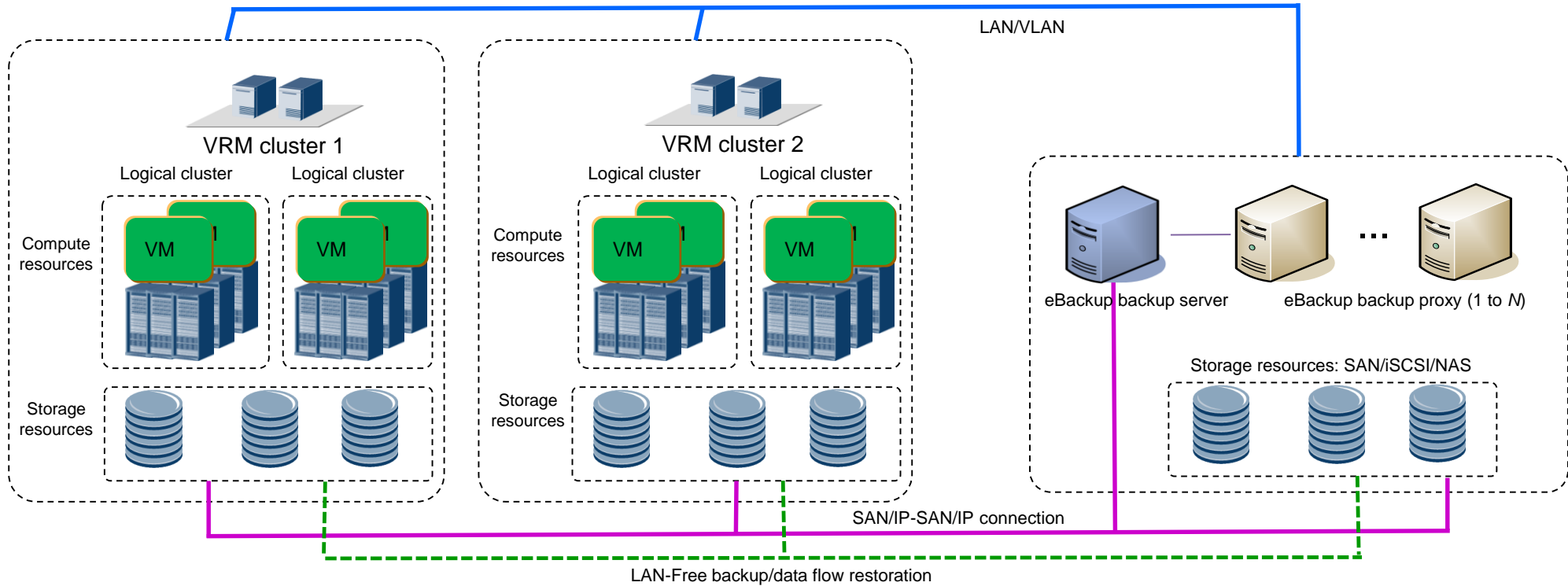
## Application Scenarios

- ✓ HA and DR capabilities for the management system need to be ensured.

## Key Technologies and Features

- ✓ Full redundancy of network links: At the virtual network layer, two or more NICs of a server can be bound into a single logical NIC to prevent outage due to the failure of a single NIC.
- ✓ All management nodes are deployed in active/standby mode and run on two independent physical servers.
- ✓ One or more identical copies for the same business-critical data are stored to ensure that such data can be fully restored when an unexpected condition occurs.
- ✓ Management nodes provide a comprehensive flow control mechanism for key system processes to prevent excessive loads on the front end.
- ✓ Clock synchronization with an external NTP clock source ensures consistent time for all NEs.

# eBackup — VM Backup Solution



## Technical Characteristics and Benefits

- Supports permanent incremental backup, significantly reducing the storage space used for backup.
- Allows flexible data restoration. The backup data can be restored to the time when the backup took place or any specified points.
- One backup system supports a maximum of 10,000 VMs.
- One backup system supports a maximum of 64 servers.
- Supports multi-site data backup.
- Supports SAN transmission mode.

## Technical Characteristics and Benefits

Huawei eBackup software is used with FusionCompute's snapshot and Changed Block Tracking (CBT) functions for VM data backup.

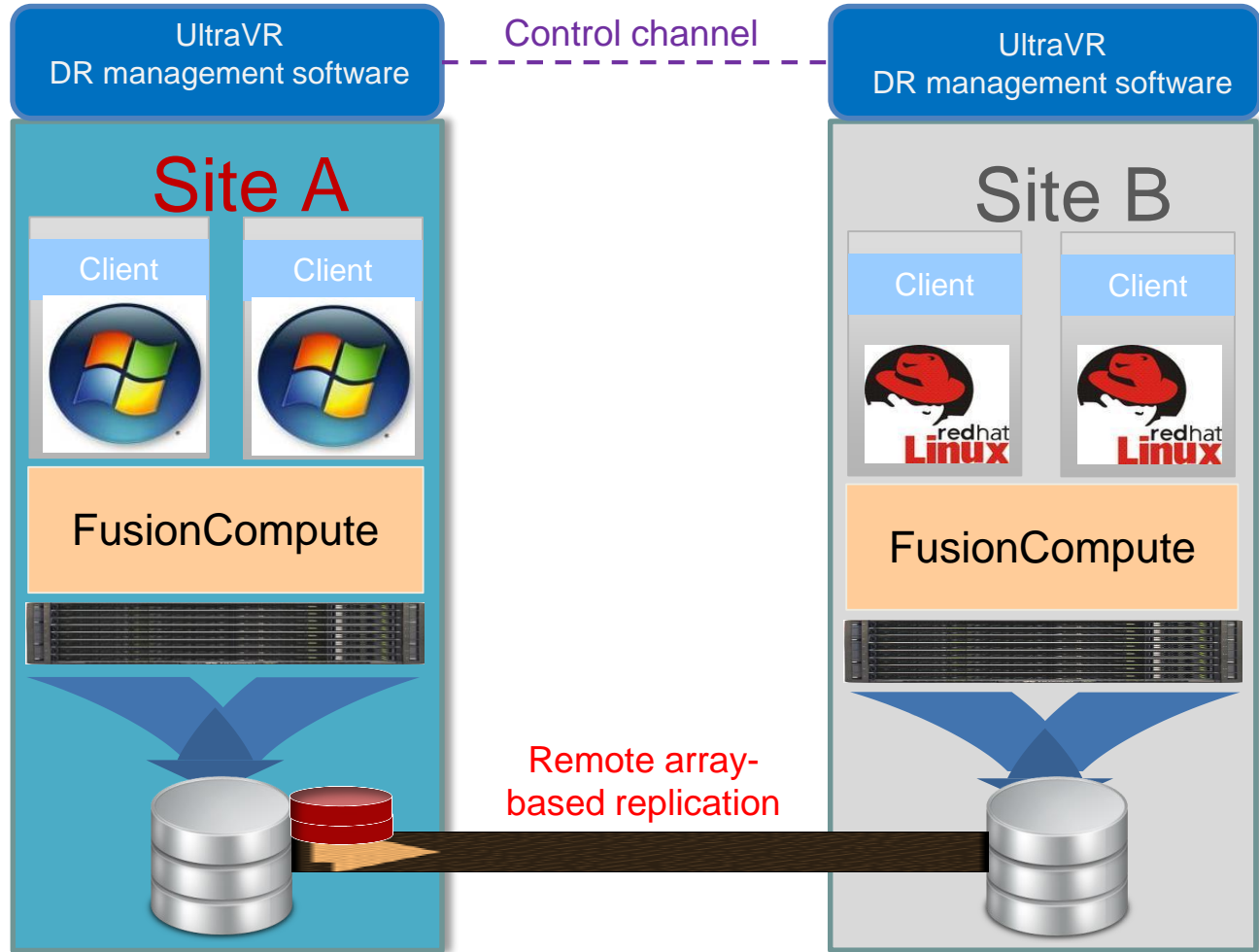
## Technical Characteristics and Benefits

- Flexible data backup
- Much more efficient management of the data backup system

## Technical Characteristics and Benefits

Quickly restores business-critical data in case of data loss, minimizing the loss caused by such data loss.

# DR Solution Based on Remote Storage Replication



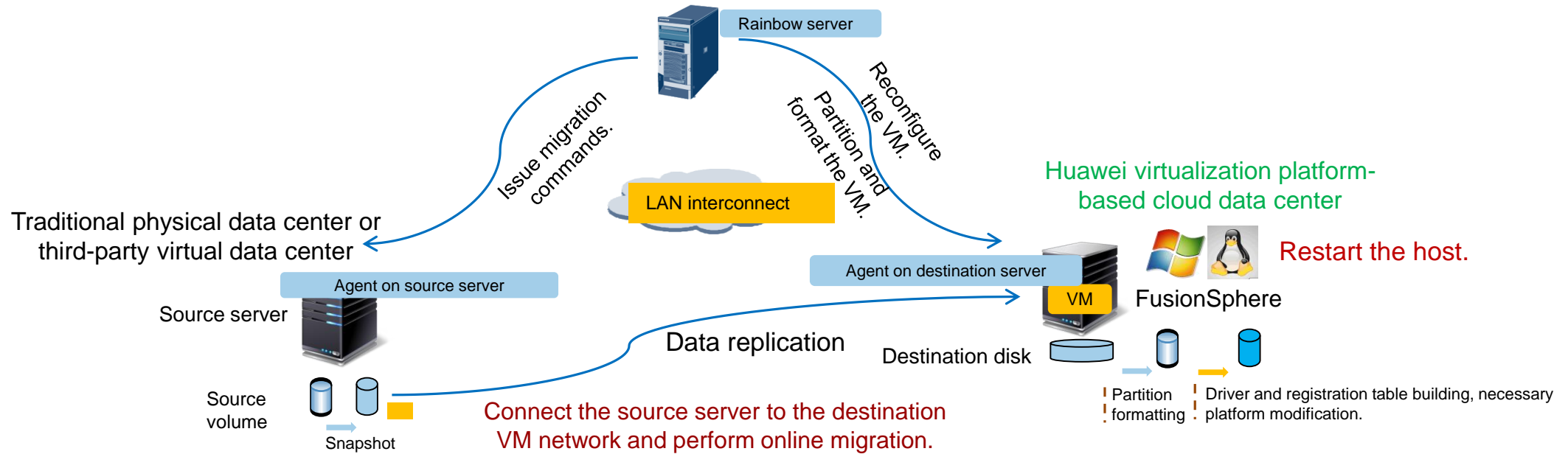
## Application Scenarios

Complete VM DR solution for application systems that have low write pressure and low requirements on storage bandwidth, IOPS, and latency

## Technical Characteristics and Benefits

- ✓ Supports DR for entire VMs, that is, including both system and data volumes.
- ✓ No agent software is required on VMs.
- ✓ The DR administrator can implement one-click DR failover, DR drills, and scheduled migration, minimizing manual operations.
- ✓ Supports synchronous and asynchronous replication.
- ✓ Supports multiple DR modes, including active/standby DR, active-active or mutual DR, or shared DR (multiple-to-one).

# Service Planning — Rainbow Migration Service



## Application Scenarios

- ✓ Migrate workloads from mainstream physical servers and servers that are based on VMware/Hyper-V/Red Hat KVM virtualization platforms to FusionSphere.

## Customer Pain Points

- ✓ Complex migration operations, low success rate
- ✓ Compatible only with a small number of mainstream OSs

## Key Technologies and Features

- ✓ Integrates interface capabilities, such as VM creation and IP address configuration, on FusionSphere cloud platform to simply migration operations.
- ✓ Uses TLS and SSH for data encryption to ensure secure transmission of user data.
- ✓ Identifies and rebuilds Windows dynamic disks and supports migration of dynamic disks.
- ✓ Supports manual configuration and scale-up/down of disk capacity after migration.

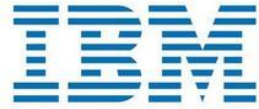
## Capability Specifications

- ✓ Rebuilds drivers that are able to boot over 100 mainstream Guest OSs of 7 OS categories, such as Windows and Linux.
- ✓ FusionSphere platform mediation pushes migration success rate to 90%, equal to benchmark vendors.



# Compatible with Mainstream Hardware and OSs

## x86 servers

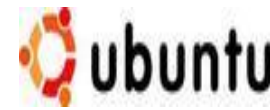


149 types of servers from 10 mainstream vendors

## Storage



## VM OSs



Over 300 types of OSs (including Chinese software)

## Network



## Applications



Visit the following website to query FusionSphere compatibility: <http://support-it.huawei.com/cloud/#/cqs>

# Contents

Key Information About Huawei FusionSphere Virtualization

Introduction to Core Features of Huawei FusionSphere 6.3.1


Huawei FusionSphere Success Stories



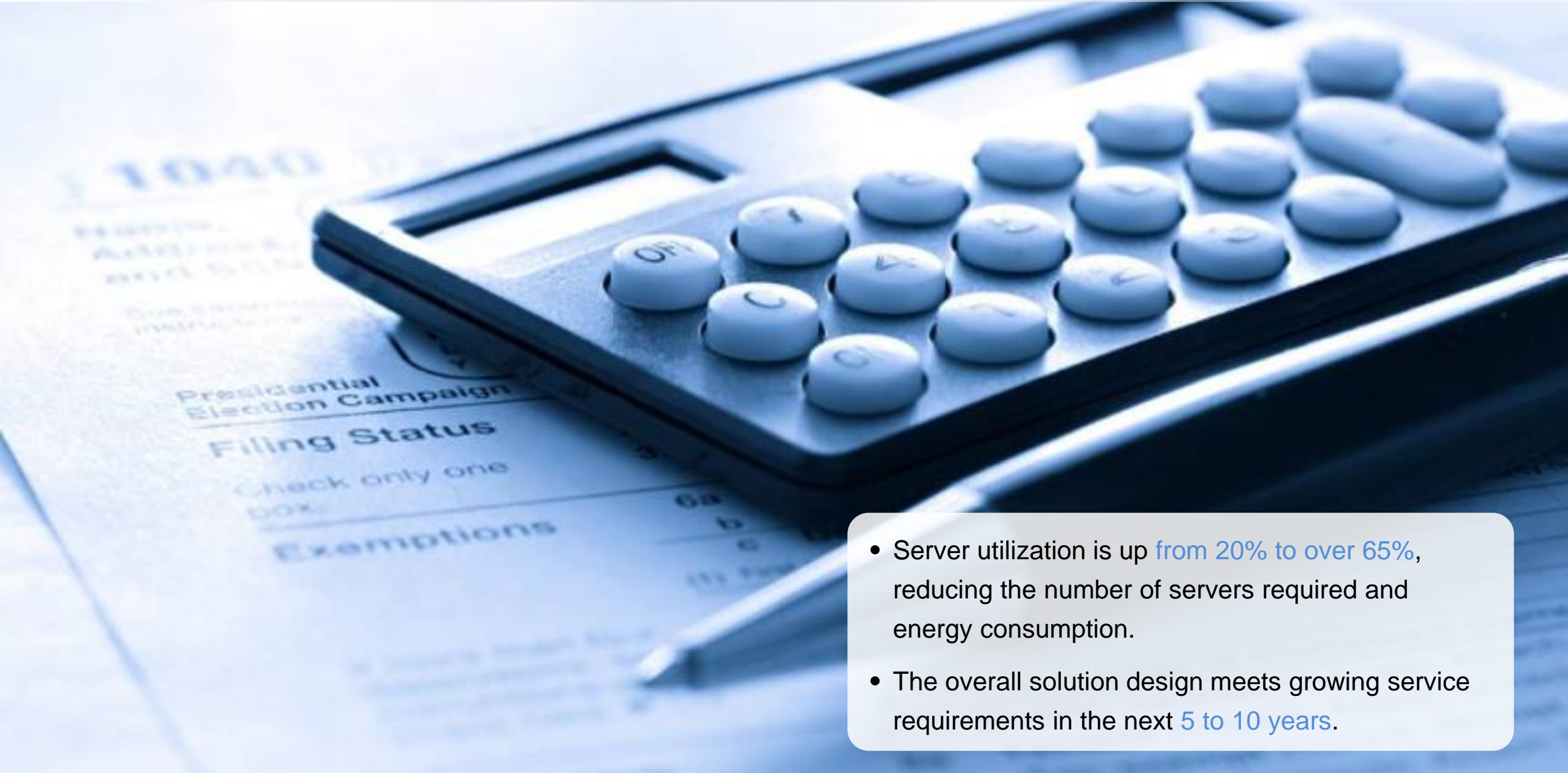


# Virtualization: State Grid Consolidates Resources to Build Hardware Resource Pools

- Unplanned outage time is down by **60%**, improving the reliability of information systems.
- Distributed deployment of management software enables **centralized control** over the resource pools of provincial subsidiaries.



# Virtualization: Cost-Saving and Efficient IT Infrastructure for China's Golden Tax Project

- 
- Server utilization is up from 20% to over 65%, reducing the number of servers required and energy consumption.
  - The overall solution design meets growing service requirements in the next 5 to 10 years.



# FusionSphere Virtualization Helps Thailand Airport Develop

Internal

- Service physical deployment requires 17 2-socket x86 servers. Huawei FusionSphere virtualization requires only 10 servers and **cuts the server purchase cost by 41.2%.**
- FusionSphere/eSight implements unified management and O&M of six nodes on the entire network, **reducing the maintenance manpower by 50%.**
- The HA feature of FusionSphere VMs solves the single point of failure (SPOF) of core components of the service system. **The system reliability is ensured** at a low cost.





# FusionSphere Virtualization Helps Brazil Metro Build Smart Transportation

Internal

- Deploys only 2 servers with related storage and network devices at each site, **reducing the server cost by 66.7%**.
- **Reduces footprint** and costs of heat dissipation and power consumption over the previous underground, expensive equipment rooms.
- **Elevates resource utilization** by implementing IT resource pools, dynamic resource allocation, and flexible scheduling.





# Distributed Cloud Data Center: Xinhua News Agency Builds a Modernized News Dissemination System

- **Distributed data centers** in its head office and branches in Daqing, Shanghai, Wuhan, Guangzhou, Hong Kong, and six chief branches outside of China
- Unified life cycle management for media information, content management decoupled from service rollout, **service rollout time reduced by at least 80%**
- An open and scalable architecture to connect to existing monitoring systems, to protect existing investments and meet future capacity requirements
- O&M efficiency improved by 10 times, helping reshape Xinhua News Agency's leadership in the media industry





# e-Government Cloud: Build Fujian e-Government Cloud with New Carrier Partnership

- Join hands with China Mobile to build a public utility cloud service platform, allowing each client to apply for IT resources on demand.
- Reduces IT costs by **30% to 40%** by avoiding wasteful IT system buildout.
- The service outage time is down to **less than 1.6 hours annually**.





# Thank You.

**Copyright © 2018 Huawei Technologies Co., Ltd. All Rights Reserved.**

The information in this document may contain predictive statements including, without limitation, statements regarding the future financial and operating results, future product portfolio, new technology, etc. There are a number of factors that could cause actual results and developments to differ materially from those expressed or implied in the predictive statements. Therefore, such information is provided for reference purpose only and constitutes neither an offer nor an acceptance. Huawei may change the information at any time without notice.