Fusion Director Infrastructure Unified Management Platform

Full-lifecycle intelligent O&M

1 Trends and Challenges

With growing business needs and technology advances, data centers are faced with increasingly sizable devices and complex O&M. High security standards for infrastructure O&M brings about high OPEX for many data centers. Therefore, increasing O&M efficiency for a lower OPEX is becoming important to the data center management

Product Description

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FusionDirector serves as a unified management software platform for intelligent infrastructure O&M throughout the server life circle. It provides intelligent deployment, intelligent identification, intelligent upgrade, intelligent maintenance, and intelligent energy-saving management throughout daily O&M with support for lowering major OPEX. FusionDirector improves O&M efficiency by 30% and saves cost greatly. It ensures security in booting, performing, datastream, compliance and decommissioning for full lifecycle user security system of xFusion servers.
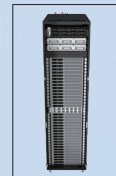
FusionDirector provides Redfish standard port for integrated docking and is widely used by carriers and enterprises in multiple scenarios of public cloud, private cloud, AI, HPC, internet, safe city system and more.

Third-party management platform

Vmware vCenter, vRops/Microsoft system Center /
OpenStack ironic /Ubuntu MAAS/Ansible/Customized System……

API integration

FusionDirector

xFusion servers

Intelligent identification

Intelligent deployment

Intelligent upgrade

Intelligent maintenance

Full lifecycle intelligent O&M

Intelligent energy saving

智能　▶ Intelligent: server AIOPS O&M platform

简单
▶ Simple: 3D visualized O&M,
▶ 100,00+ enterprises O&M experience available

分布式
▶ Distributed: distributed architecture, flexible expansion;
▶ single 8C-16G node manages 5,000 servers

3 Key Features

Intelligent upgrade

Cloud-Based, Responsive, One-Click Automated Delivery Makes Users Worry Free

FusionDirector prevents the presence of frequent manual interventions, high security risks, and insufficient concurrency during upgrade process. Based on the xFusion online upgrade platform, FusionDirector enables fast upgrade for firmware and drives. The E2E feature provides one-click delivery covering automatic push, automatic download, automatic matching, and automatic upgrade, improving O&M efficiency by 20% and saving costs

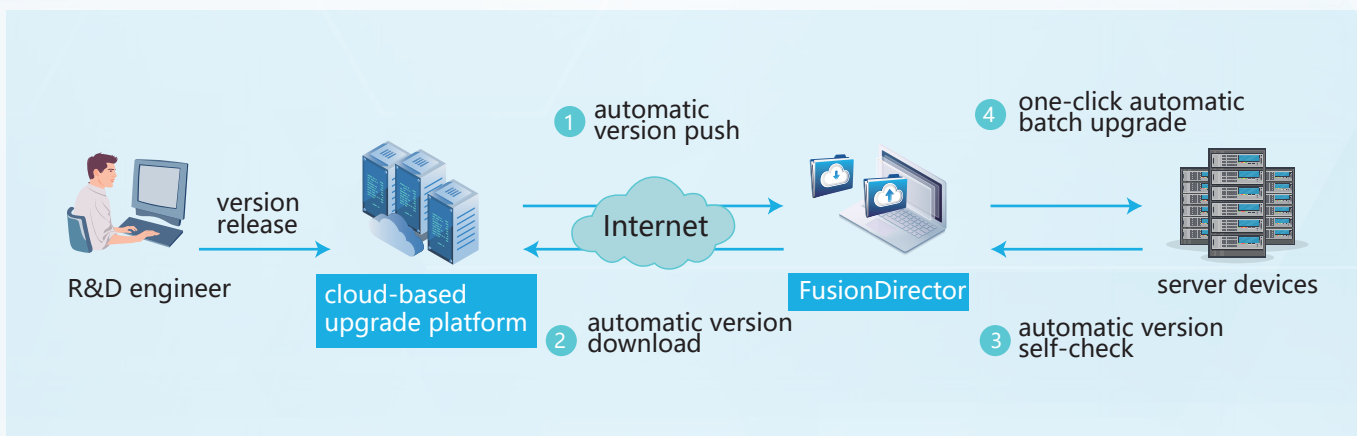| Automatic downloads and checking of firmware, drive and OS versions, without requiring for manual operations | Separate management on firmware upgrade and running, reducing impacts on business system | Firmware baseline management, enabling quick upgrade or downgrade for the firmware | Independent out-of-band upgrade channel, increasing business bandwidth availability |

Upgrade efficiency improving by 20 times

One-click automatic batch upgrade

Productive E2E cloud-based collaboration

R&D engineer → version release → cloud-based upgrade platform → ① automatic version push → Internet → ② automatic version download → FusionDirector → ③ automatic version self-check → ④ one-click automatic batch upgrade → server devices

Features	Description	Specification
Upgrade package repository management	▸ Automatic： automatically import the upgrade package from the Houp website ▸ Manual： manually import the upgrade package from the FusionDirector	Device range for upgrade: ▸ Server model: rack server, E9000 V5 blade server, high-density server, heterogeneous server and cabinet server
Upgrade package repository management	▸ Automatic： create the online upgrade plan. Automatically upgrade when current version is not consistent with the version specified in the upgrade plan ▸ Manual： create the online upgrade plan. The device is upgraded at the time specified in the upgrade plan. The specified time can be set to immediate or later.	▸ Out-of-band firmware: BIOS, BMC, CPLD, NVMe, PSU ▸ In-band firmware: NIC, RAID, HDD, PCIe-SSD, MCU, CDR, ▸ RetimerE9000 switch board firmware: BMC, CPLD, Mezz Plane OS/Patch, LOM Plane OS/Patch, and FC Plane OS ▸ E9000 management board firmware: HMM, CPLD, LCD, and fanSupported ▸ OS Version: Suse Linux Enterprise, RedHat Linux Enterprise, CentOS/Windows Server, and Vmware ESXi

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Intelligent Deployment

Easy, Efficient, and One-click Mode Switch, Process Automation Solution

Process automation from firmware commissioning, server commissioning, software commissioning and acceptance improves installation efficiency by 10 times. Intelligent deployment allows one-click switch among high performance work modes including distributed storage, big data, database, virtualization, Web server, HPC, and more.

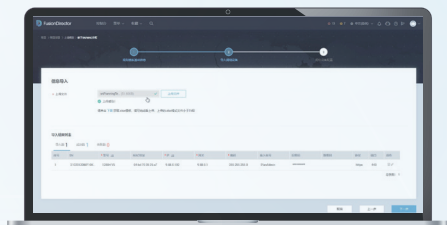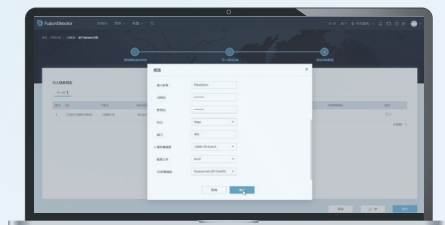| Online planning: quickly import device information with one click, set the device portfolio in an easy and efficient way.	Automatic identification: U space automatic locating for device import.	Automatic deployment: automatically configure the BMC, BIOS, RAID, and the OS	Automatic verification: automatically verify device configurations to ensure that the device is configured right after upgrade.

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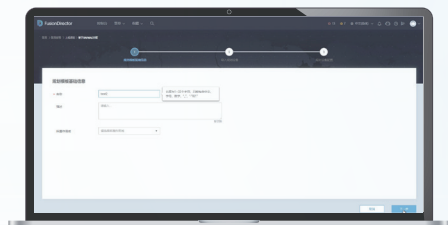
Step 1: set the device portfolio   Step 2: import the configured devices   Step 3: set the device configurations

Features	Description	Specification
Features	▸ Enable device configuration information integration into a Profile configuration management file and copy to other devices for batch configuration. ▸ Enable E9000 blade server chassis configuration.	▸ Configuration template: batch management of the Profile configuration file, including creating, importing, binding, application, unbinding, deleting, exporting and replication the file. ▸ Component configuration: BIOS, RAID, NTP, DNS, LDAP, HBA, CAN, LOM, and more. ▸ E9000 chassis configuration: server configuration connected to front board slots, chassis switching network configuration, fan speed mode, PSU hibernation mode, power capping and other electromechanical configurations.
Device deployment	▸ OS image: manual OS image import ▸ OS deployment: BMC out-of-band network access, OS batch installation functions based on the SP mounted image, and simultaneous deployment of up to 30 devices.	▸ Supported OS image type and version: RedHat, VMware, SUSE, CentOS, Windows, Ubuntu16.04, EulerOS, OpenEuler, Debian, BCLINUX, NeoKylin, Kylin ▸ Supported device: V5/V6 rack server, E9000 V5 blade server, high-density server, heterogeneous server and cabinet server. ▸ Supported RAID controller card: LSI SAS3008, LSI SAS3108,AvagoSAS3408, AvagoSAS3508, AvagoSAS3004,AvagoSAS3416IT, AvagoSAS3516AHCI

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Intelligent Discovery

Real-Time Automatic Management of Component-Level Visualization

The intelligent discovery feature avoids common challenges in manual asset management including human error, high cost, track difficulties, and wasted spaces. With industry-leading U space anti-interference technology, FusionDirector enables automatic asset management of component-level covering CPU, memory, hard disk, PSU, RAID card, fan module and more. Intelligent Discovery can reach 100% accuracy rate and output management report in seconds, delivering real-time visualized track and maximizing space utilization. It helps save 100,000 dollars for every 1000 cabinets per year compared with manual management.

Automatic management of 100% accuracy in seconds	Component-level visualized management dynamic	Component-level visualized management dynamic	REST port, third-party CMDB connection supported for

SN CPU

U space Memory Hard drive

iRM

FusionDirector asset management

IT asset management system

CMDB/Others

Automatic U space recognition

Automatic warehousing

Asset report

Automatic asset management

Automatic inventory

Automatic asset reconciliation

Asset change management

Item	Description
Asset statistics overview	▸ Displays data center total assets, cabinet space usage, service time, and more. ▸ Displays asset change overview, including installation, uninstallation, components replacement, and more.
Asset details display	▸ Displays detailed information about servers, storage, networks, racks, cabinets, and other equipment, including device name, serial number, IP address, location, manufacturer, model, footprint, installation date, and more. ▸ Displays the detailed information about server hard drive, memory, CPU and mainboard, including device name, serial number, manufacturer, model, related devices, serial number, and more.
Asset change record	▸ Records the equipment change events and trends, including the change date, change type, device name, asset code, equipment type, equipment location, and description. ▸ The asset change record is an explicit display of the overall change trend of each stage and the latent risks in equipment and components.
Cabinet detailed view	▸ Basic cabinet information, including the cabinet position, rated power, size, height, power supply, temperature, footprint, and more. ▸ Cabinet power consumption information, including power capping status and power consumption statistical trend. ▸ Cabinet device list, including device name, type, model, serial number, power consumption, alarm status, and temperature

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Intelligent Energy

Cost Reduction, Efficiency Improvement, Dynamic Energy Saving, and Elaborate Fine Tuning

Data center power consumption accounts for 60% of the OPEX, 44% of which owes to server power consumption. Server energy saving is critical to data center efficient operation. FusionDirector integrates multiple technical advances to upgrade the dynamic energy management technology (DEMT) to the 2.0 version, cutting whole-system energy consumption by 18% with self-developed MPC-PID energy saving algorithm.

The 3D data model visualizes the information about data center and cabinet such as temperature, power consumption, footprint, and more.

The dynamic energy management technology (DEMT) dynamically adjusts server operation status, making transient energy saving adjustments without effecting the performance.

With the help of AI technology, it precisely predicts the power supply trends and provides cabinet-level power consumption management

The analysis of power supply risks, space utilization, ambient temperature, and low-load servers of the cabinet facilitates workload adjustment and improves resource utilization
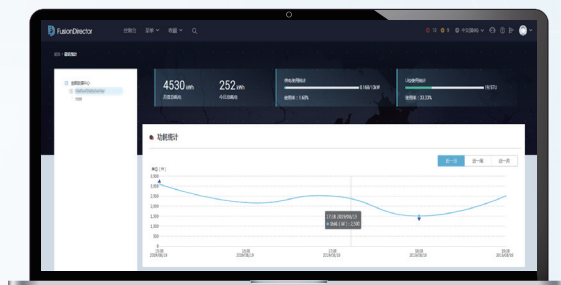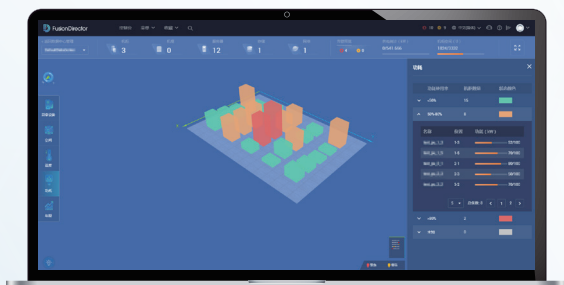
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According to statistics, the electricity cost of a single server in 3-5 years is about equal to the price of the server itself. A customer with a scale of 10,000 servers can save CAPAX of 400 servers every year.

DEMT 2.0	Upgraded technologies			
	Frequency modulation	Adjust the CPU working frequency based on the actual workload.		Energy efficiency up by 18%
	Hibernation	Spin-down memory modules, drives, and PSUs based on actual workload.		
	DTS	Based on the relation between CPU performance and temperature, control the fan speed within the margin value to reduce the overall energy consumption.		
	MPC-PID	Based on AI algorithm, conducts dynamic adjustment to find the lowest power consumption point based on workload, temperature, performance, and fan speed.		
	Loss reduction	Three patented technologies • Bridgeless PFC • Multi-phase magnetics integration • Interleaved PFC		

Item	Description
Cabinet-level power consumption management	Analyzes the power consumption trend of the server, dynamically adjusts the power cap of the server, and ensure the power supply security of the cabinet without affecting the performance
Low-load server analysis	Analyzes long-term low-load server lists to support workload adjustments and take further energy-saving measures.
Power supply & spatial distribution optimization analysis	Collects statistics on the power supply and spatial distribution of cabinets, analyzes power supply risks, and provides solutions.
Temperature risk analysis	Analyzes the high-temperature environment and identify hot spots

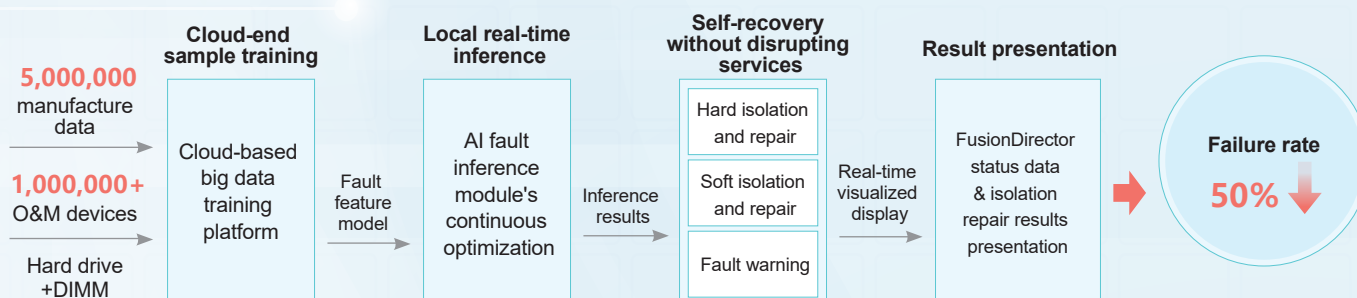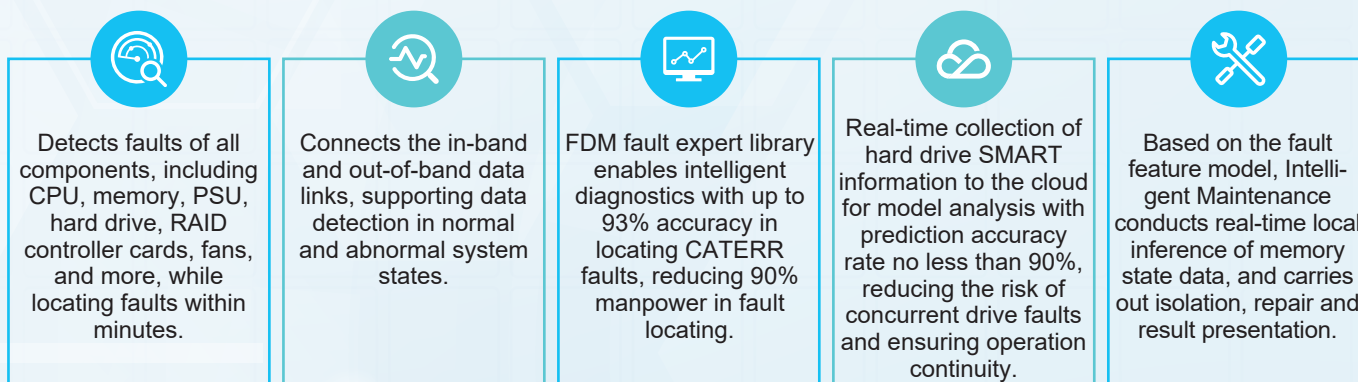Scan the QR code to watch the video

Intelligent Maintenance

Stable and Secure Operation, Accurate Fault Locating, and Integration of Prevention, Diagnosis, and Self-Healing

According to statistics, hard drive failures account for more than 48% of data center server failures, and memory failures account for 61% of system down accidents.Equipped with intelligent fault diagnosis technology, hard drive fault prediction technology, and memory fault self-recovery technology, FusionDirector provides a diagnosis accuracy rate up to 93%, reporting drive faults 7 to 30 days in advance to prevent accidents. In addition, the intelligent memory fault recovery technology reduces the breakdown rate by over 50%.

Detects faults of all components, including CPU, memory, PSU, hard drive, RAID controller cards, fans, and more, while locating faults within minutes.	Connects the in-band and out-of-band data links, supporting data detection in normal and abnormal system states.	FDM fault expert library enables intelligent diagnostics with up to 93% accuracy in locating CATERR faults, reducing 90% manpower in fault locating.	Real-time collection of hard drive SMART information to the cloud for model analysis with prediction accuracy rate no less than 90%, reducing the risk of concurrent drive faults and ensuring operation continuity.	Based on the fault feature model, Intelligent Maintenance conducts real-time local inference of memory state data, and carries out isolation, repair and result presentation.

5,000,000 manufacture data

1,000,000+ O&M devices

Hard drive +DIMM

Cloud-end sample training
Cloud-based big data training platform

Fault feature model

Local real-time inference
AI fault inference module's continuous optimization

Inference results

Self-recovery without disrupting services
Hard isolation and repair
Soft isolation and repair
Fault warning

Real-time visualized display

Result presentation
FusionDirector status data & isolation repair results presentation

Failure rate
50% ↓

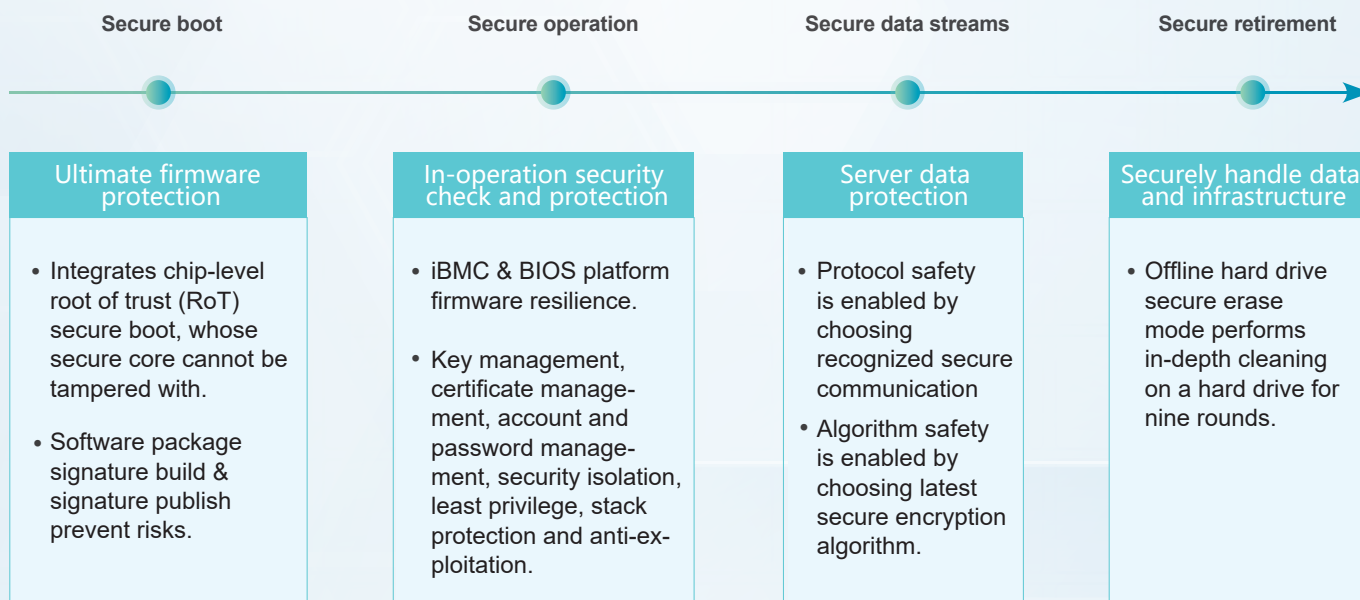xFusion Digital Technologies Co., Ltd.

Key Features

Feature	Description
Component monitoring	CPU, memory, PSU, hard drive, RAID controller card, fans and other components are monitored for status and resource usage, with full out-of-band monitoring and management supporting graphical display.
Fault prediction	SAS/SATA drives data are collected, using AI algorithm to predict hard drive failure in advance.
Fault self-recovery	Based on the AI fault inference module, the memory status is diagnosed and analyzed, and memory fault isolation and self-recovery are automatically performed. 。

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Intelligent Maintenance

Secure boot	Secure operation	Secure data streams	Secure retirement

Ultimate firmware protection

- Integrates chip-level root of trust (RoT) secure boot, whose secure core cannot be tampered with.
- Software package signature build & signature publish prevent risks.

In-operation security check and protection

- iBMC & BIOS platform firmware resilience.
- Key management, certificate manage-ment, account and password manage-ment, security isolation, least privilege, stack protection and anti-ex-ploitation.

Server data protection

- Protocol safety is enabled by choosing recognized secure communication
- Algorithm safety is enabled by choosing latest secure encryption algorithm.

Securely handle data and infrastructure

- Offline hard drive secure erase mode performs in-depth cleaning on a hard drive for nine rounds.

Technical specifications

Basic management	FusionServer servers	Supports mainstream models of FusionServer servers
	Non-FusionServer servers	Supports mainstream models of non-FusionServer servers
	Alarm monitoring	24/7 remote alarm monitoring and automatic trouble ticket creation
	Visualization	The 3D data model visually displays the equipment status anomaly, footprint, temperature, power consumption, duration of service, and other information of the data center and cabinet.
	Equipment management scale	Single set: 12,000 racks or 200 E9000 chassis Tiered: Cascading 256 sets, 3 million (256 x 12000) units of servers
	Network constrains	Supports IPV4 and IPV6 networks
	Resolution	Recommended resolution: 1920 x 1080/1680 x 1050
	Browser	Google Chrome、Mozilla Firefox、Safari、Microsoft Edge
Intelligent O&M	Intelligent maintenance	FusionDirector diagnoses faults with an accuracy rate up to 93%. AI-powered memory fault recovery technology integrates prevention, diagnosis, and self-healing functions, covering 85.44% system failure scenarios, reducing breakdown rate by 50%. AI-powered drive fault prediction technology reports drive faults 7 to 30 days in advance.
	Intelligent upgrade	One-time strategy formulation and one-click batch upgrade improve O&M quality, reduce O&M costs, and increase upgrade efficiency by 20 times.
	Intelligent energy saving	DEMT 2.0 reduces whole-system energy consumption by 18%, saving OPEX equaling to 400 servers per 10,000 servers every year
	Intelligent discovery	FusionDirector realizes automatic asset inventory with 100% accuracy, outputs inventory report in seconds, visualizes real-time track tracing, and improves space utilization. Compared with manual inventory, it saves about $100,000 per 1,000 racks per year.
	Intelligent deployment	Supports the deployment of mainstream operating systems, improves 10 times installation efficiency from hardware planning to upper-layer software, and achieves automatic configuration, management, and OS deployment for 100 servers per day.
Open interfaces	Open interfaces	Provides northbound API interfaces that follow the RESTful protocol, including basic management and intelligent O&M interfaces, which greatly simplifies integration with third-party systems and shortens installation time.

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