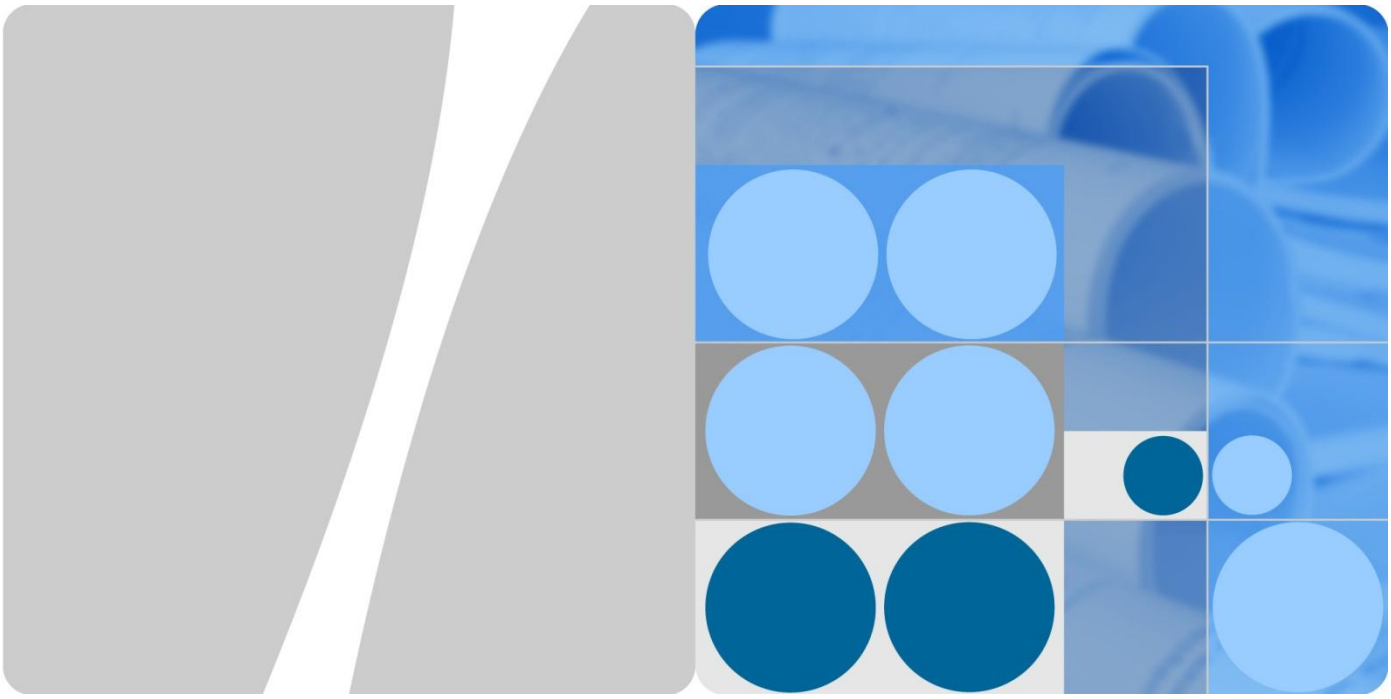

Huawei FusionCloud Desktop Solution 5.3

Branch Technical White Paper

Issue 01

Date 2015-06-30

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Contents

1 Branch Overview

1.1 Background

As enterprise markets are developing, an enterprise will have more and more branches around the world. A branch usually has a few employees. To reduce maintenance costs, branches need to be centrally managed. Therefore, Huawei provides the FusionCloud desktop solution for branches. With this solution, the system is simplified, and the distributed deployment capability is improved, thereby improving system flexibility.

1.2 Customer Benefits

- Superb user experience

  User virtual machines (VMs) are deployed in branches, which have good network quality. Thin clients (TCs) and VMs in branches directly connect to FusionCloud desktop systems over the Huawei Desktop Protocol (HDP), and the bandwidth of branches and headquarters is not occupied. Therefore, users have good experience.

- High reliability

  Desktop management software is deployed in branches. If the data center at headquarters fails or networks between the headquarters and the branches are interrupted, users in branches can still access local virtual desktops over HDP.

- Centralized management

  Centralized management and rights- and domain-based management are implemented at headquarters. Administrators at headquarters can set branch administrators to manage branch services. Branch administrators can create and manage local templates and store these templates in local disks. When user VMs need to be created, branch administrators load templates from local disks to prevent the bandwidth of branches and management centers from being occupied. In addition, branch administrators can also perform operations on hardware.

- Centralized backup

  User and management data of branches is backed up in a unified manner by using network attached storage (NAS) devices at headquarters, avoiding repeated investment.

- Low network requirements

  Only management data is transmitted between the headquarters and the branches through the network. Local traffic is used for VM remote desktops. This eliminates the need for network bandwidth. The bandwidth required is less than 2 Mbit/s, and the delay is less

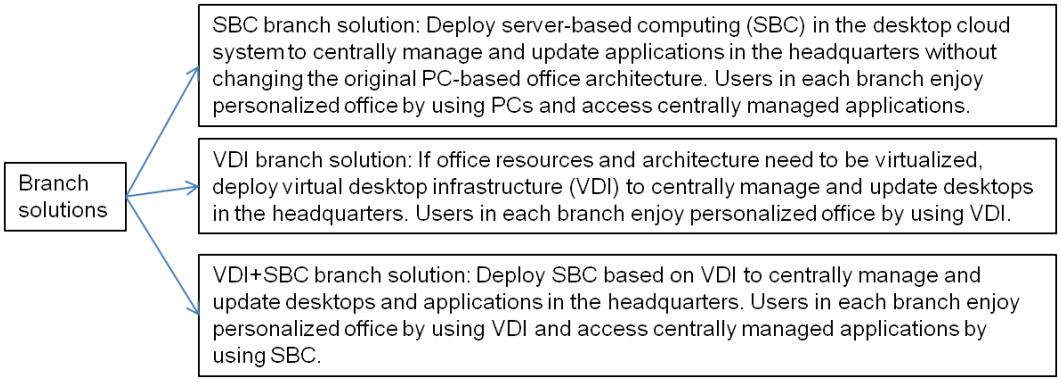
than 120 ms. If traditional centralized deployment and remote access are used, office automation (OA) requires high network bandwidth and low delay. If video and audio services are required, higher network bandwidth and lower delay are required.

2 Branch Solution Overview

2.1 Branch Solution Types

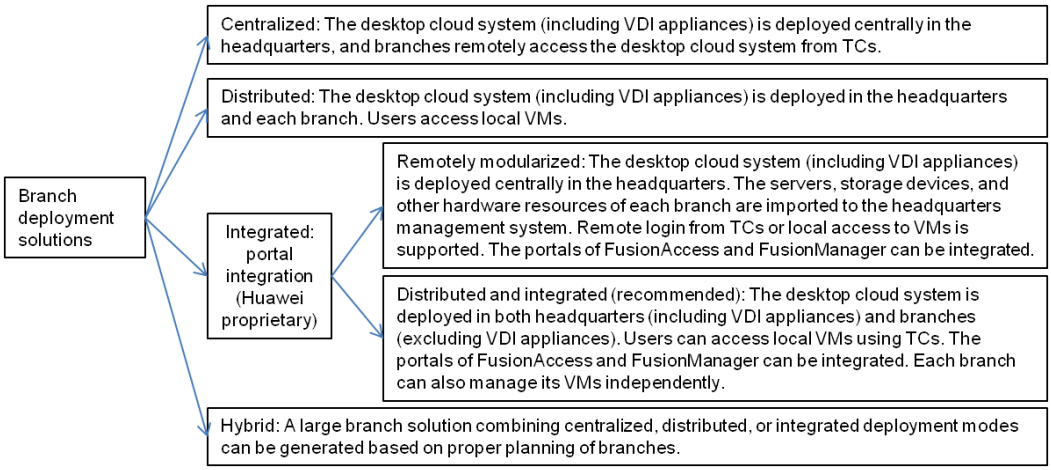
2.1.1 Classification by Function Characteristics

Figure 2-1 Overview of branch solutions



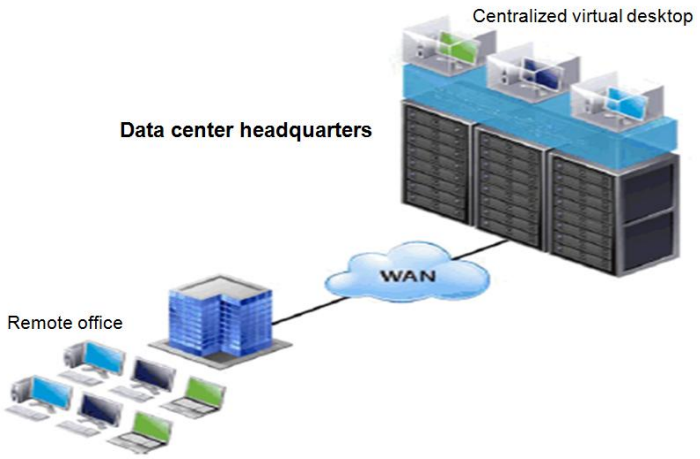
2.1.2 Classification by Deployment Characteristics

Figure 2-2 Overview of branch deployment solutions



2.2 Centralized Deployment

Figure 2-3 Centralized deployment branch solution



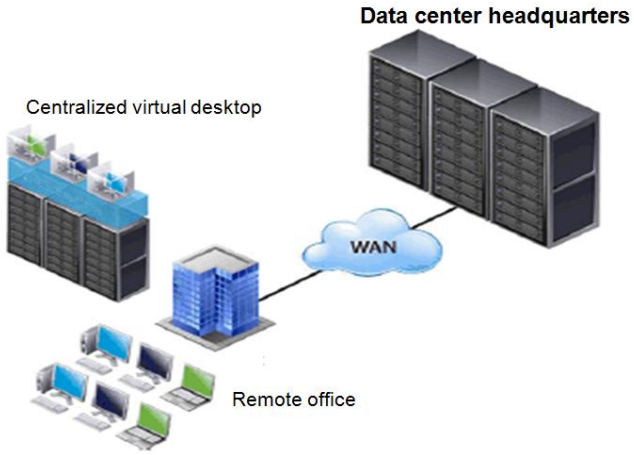
The FusionCloud Desktop Solution supports the traditional centralized deployment mode, meeting branch deployment requirements. The centralized deployment branch solution has the following features:

- The virtualization management software FusionManager (optional), desktop cloud software FusionAccess, infrastructure virtualization software FusionCompute, and all hardware resources (such as servers and storage devices) are deployed in the headquarters data center.
- Users in branches remotely access virtual desktops on the server hardware in the headquarters data center by using access devices, such as TCs.

- This deployment solution has high requirements for the bandwidth and quality of the network between the headquarters data center and the branches. If the network bandwidth is insufficient or the network is unstable, the branch user experience will be affected. When a network fault occurs, branch office users cannot use virtual desktops.

2.3 Distributed Deployment

Figure 2-4 Distributed deployment branch solution

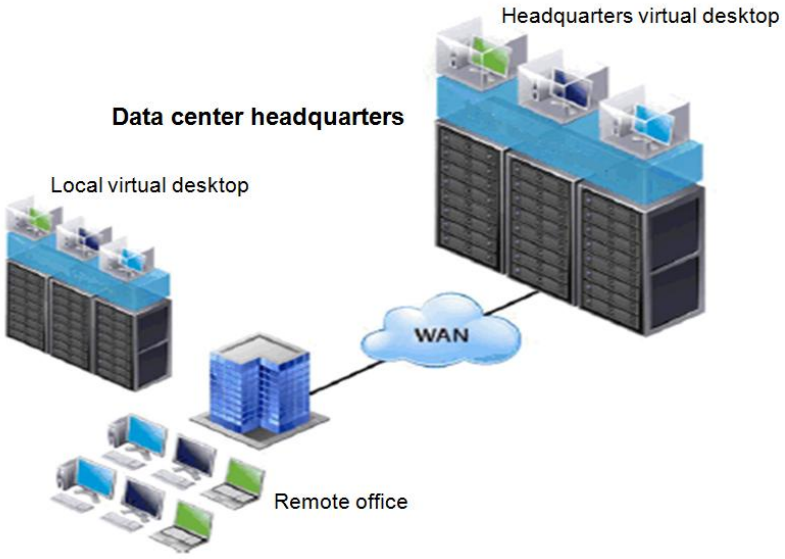


The FusionCloud Desktop Solution supports the traditional distributed deployment mode, meeting branch deployment requirements. The distributed deployment branch solution has the following features:

- The headquarters data center and branches have their own hardware resources (such as servers and storage devices) and deploy the virtualization management software FusionManager (optional), desktop cloud software FusionAccess, and infrastructure virtualization software FusionCompute.
- Users in branches access the virtual desktops on the server hardware in the nearest branch desktop cloud systems by using access devices, such as TCs.
- The headquarters data center can remotely access the portal of each branch desktop cloud system to perform unified operation and maintenance (O&M).
- This deployment solution has relatively low requirements for the bandwidth and quality of the network between the headquarters data center and the branches. If the network bandwidth is insufficient or the network is unstable, the headquarters administrators' remote management and O&M are affected, but the branch user experience is not affected. When a network fault occurs, the headquarters administrators cannot perform remote management and O&M for branch desktop cloud systems. In this case, branch administrators need to perform management and O&M locally.

2.4 Integrated Deployment

Figure 2-5 Integrated deployment branch solution



The FusionCloud Desktop Solution supports the integrated deployment mode, meeting branch deployment requirements. The integrated deployment branch solution has two deployment sub-modes: remotely modularized deployment mode and distributed and integrated deployment mode. The integrated deployment mode is Huawei proprietary. For details, see the subsequent sections.

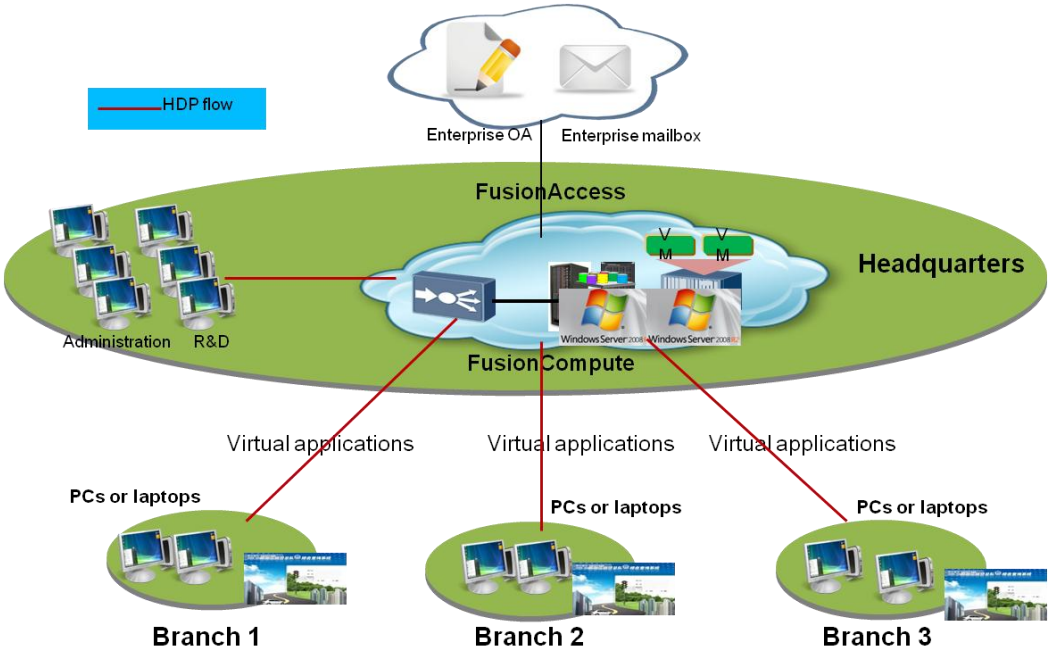
2.5 Hybrid Deployment

The FusionCloud Desktop Solution supports the hybrid deployment mode, meeting branch deployment requirements. Based on geography, administration, network bandwidth, network quality, and other factors, the hybrid deployment branch solution divides large branch of an enterprise into several small branches, deploy branches by using the centralized, distributed, or integrated deployment mode, and finally form a large branch solution in hybrid deployment mode.

3 Centralized SBC Deployment Branch Solution (Recommended)

3.1 Centralized SBC Deployment Branch Solution

Figure 3-1 Software deployment of centralized SBC deployment branch solution



Software deployment of centralized SBC deployment branch solution is described as follows:

- The desktop cloud software FusionAccess, virtualization management software FusionManager (optional), and infrastructure virtualization software FusionCompute are deployed in the headquarters data center.
- Enterprise office applications, such as the ERP system, E-HR system, and Kingdee K3 system, are centrally deployed in the headquarters data center and centrally managed, published, and updated in the headquarters. No management system needs to be deployed in branches. Users in branches remotely access enterprise applications using PCs or laptops.

3.2 Application Scenarios

3.2.1 Challenges to Traditional Solutions

Traditional PC-based office architecture faces the following challenges in branch scenarios:

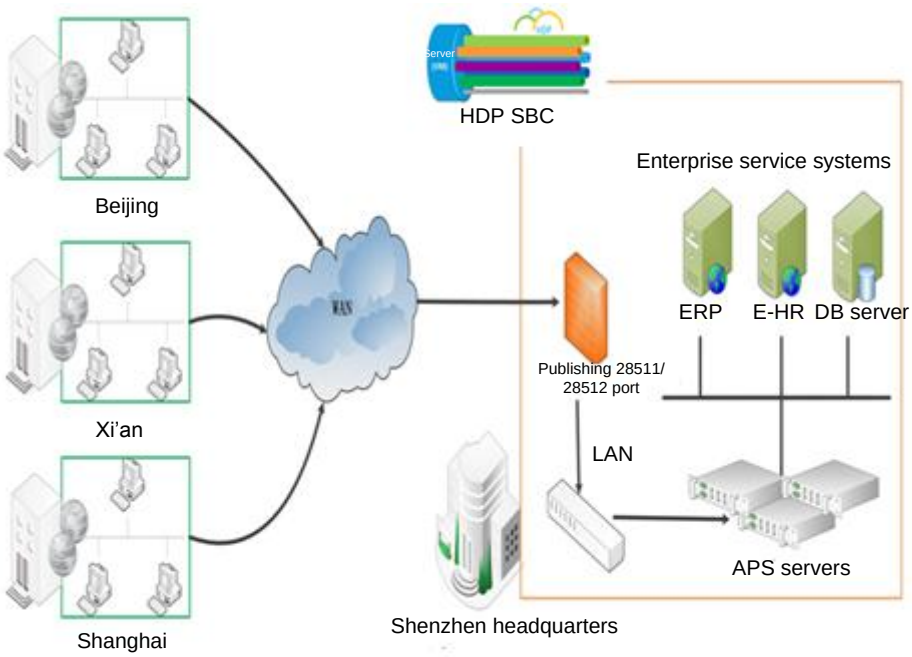
- **Complex and high-cost system O&M:** Adoption of client/server (C/S) architecture results in high maintenance costs. When applications are modified or upgraded each time, each remote client must be updated, which consumes a large amount of labor and money.
- **Poor system security:** When branches exchange data with the headquarters, the data may be intercepted by competitors or hackers, which incurs immense losses to enterprises.
- **Low access rate:** When clients access applications centrally deployed in the data center, the access rate may be affected by insufficient bandwidth or network instability. As the number of branches increases, the access rate will decrease.
- **Distributed data storage:** When branches access traditional C/S applications, data must be stored in each branch to ensure access performance. In this case, the headquarters cannot learn service status of each branch in real time.

3.2.2 Solution

As markets are developing, an enterprise will have more and more branch offices around the world. A branch usually has a few of employees and is far away from the headquarters. Branches need to connect to the application systems deployed in the headquarters.

Branches usually have weak IT maintenance capabilities. To reduce maintenance costs, branches need to be centrally managed. To achieve this purpose, SBC is added to the existing office mode. SBC publishes virtual applications, and branch employees remotely access the virtual applications using PCs to improve work efficiency.

Figure 3-2 Application scenario of centralized SBC deployment branch solution



A virtual application publishing platform is deployed in the headquarters data center. Branch employees use PCs or laptops to access virtual applications published by the virtual application publishing platform through private lines or virtual private networks (VPNs).

3.2.3 Solution Highlights

The centralized SBC deployment branch solution adds SBC to the existing PC-based office architecture of enterprises to address challenges facing enterprises. This solution provides the following highlights:

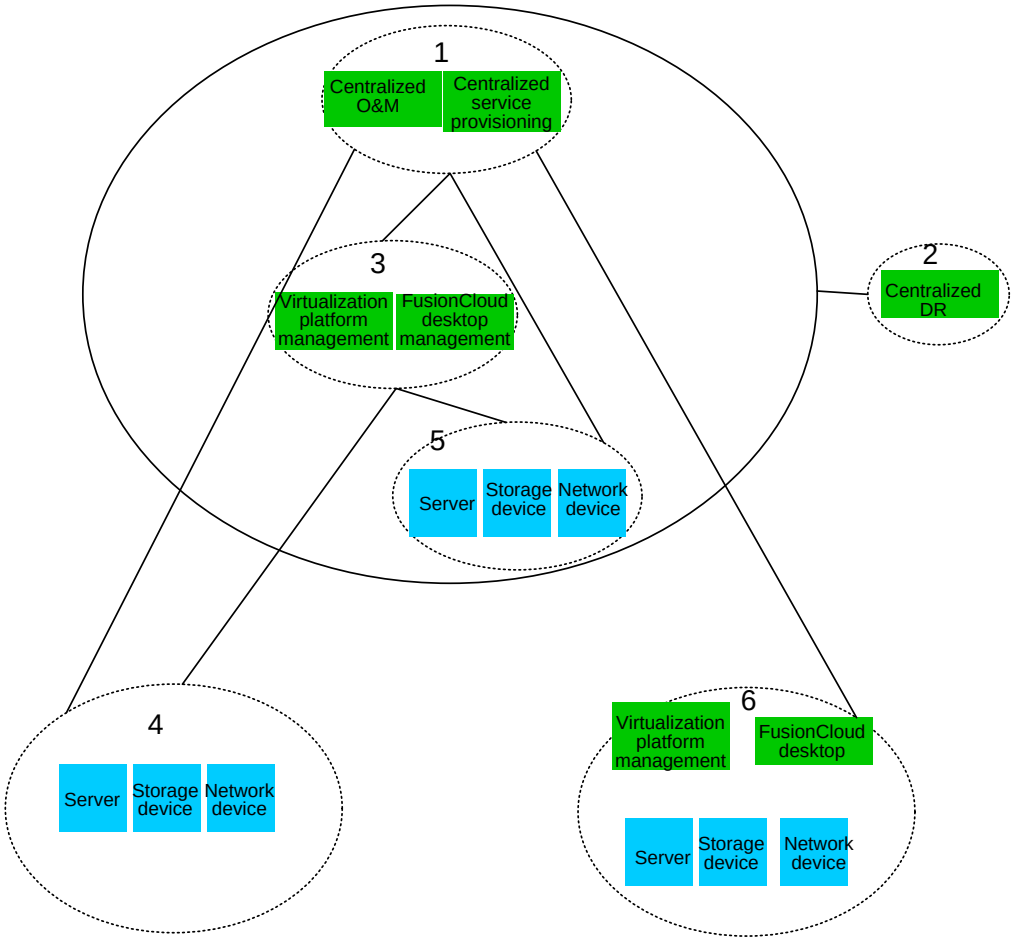
- **Centralized application deployment and optimized IT management:** Applications are installed on application servers and centrally managed. No plug-in needs to be installed on clients for application access so that clients do not need to be maintained. This greatly reduces IT maintenance workloads. In addition, new applications can be quickly deployed, and application upgrade involves several servers only.
- **Diversified clients:** Users can access all background applications after installing the HDP AccessClient software on their terminals. The HDP AccessClient supports multiple types of operating systems (OSs). Users can access services and office systems using any device anytime, anywhere.
- **Quick access:** SBC adopts HDP to run applications on servers, requiring low bandwidth. In normal cases, each user occupies 40 kbit/s bandwidth only, greatly reducing private line investment.
- **High availability:** All applications and data are centrally managed in the background. System processes of applications are not interrupted even if the network is interrupted. The front-end desktop operations are automatically stored in the background. When the network recovers, all operations can resume. The application server (APS) supports load balancing. The system automatically distributes user requests to APS servers based on preset policies or APS server loads. Breakdown of any server, except the License Server, will not affect operation of other servers.
- **High security:** Applications and data are running on the server. Users only view screen refresh information on the clients, which ensures data security. Operation permission on clients can be set based on policies, such as permission to view desktops, use printers, and store data locally. This ensures controllable information usage.
- **Low risk:** SBC deployment does not require reconstruction or rebuild of the existing system, and switchover to a new system does not interrupt services. A new system can be built by adding new servers to the network. Existing operation interfaces and usage methods are retained. Therefore, no extra training is required. In addition, PCs can be reused, which reduces costs.

4 Integrated VDI Deployment Branch Solution (Recommended)

4.1 Integrated VDI Deployment Branch Solution

4.1.1 Logical Architecture

Figure 4-1 Logical architecture

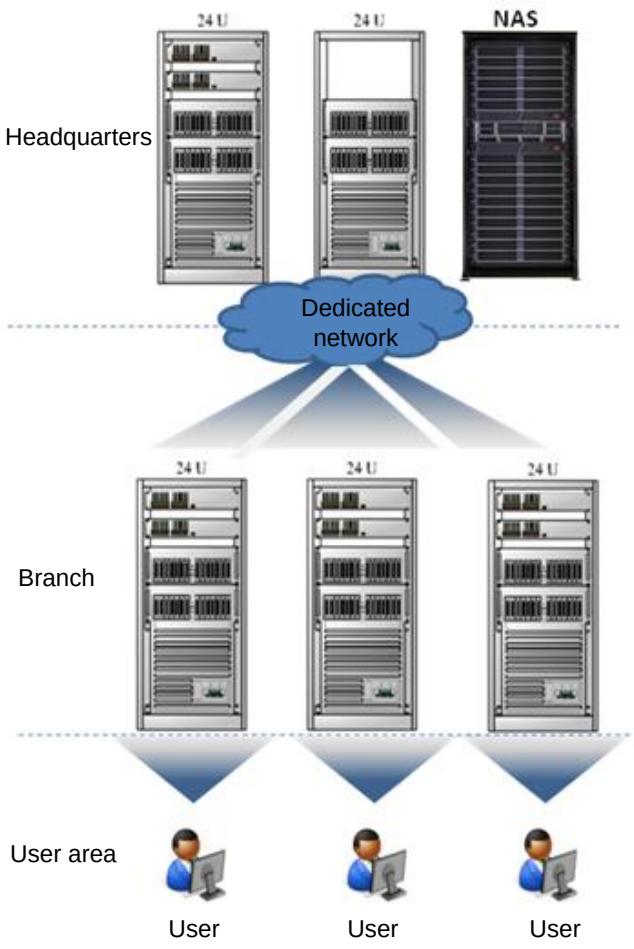


Logical architecture of branches:

- (Recommended) The branch mode on the right (sub-mode 1: distributed integration mode, including 1, 3, 5, and 6) shown in section 4.1 "Integrated VDI Deployment Branch Solution": mandatory to scenarios, such as the education system, where network reliability is not ensured. When network reliability is ensured, this mode is also recommended.
  - Advantages: If the data center at headquarters fails or networks between the headquarters and the branches are interrupted, local desktop services, unified management at headquarters, and local branch maintenance are not affected.
  - Disadvantages: A suite of management software is deployed for each branch, increasing costs and maintenance workload.
- The branch mode on the left (sub-mode 2: distributed integration mode, including 1, 3, 4, and 5) shown in section 4.1 "Integrated VDI Deployment Branch Solution": applies to scenarios, such as carrier scenarios, where network reliability must be ensured.
  - Advantages: Centralized management is implemented, so that management nodes do not need to be deployed for branches. This reduces costs and maintenance workload.
- Integrated deployment also supports the hybrid deployment of the sub-modes on left and right.
  - Disadvantages: The headquarters and branches require high network quality. When networks are disconnected, local services are interrupted.

4.1.2 Typical Hardware Deployment and Networking

Figure 4-2 Typical hardware deployment and networking



Typical hardware deployment and networking:

1. Two RH2288H servers are configured at headquarters to deploy management software in unified manner. The N2000 can be used as the NAS device.
2. One or two RH2288H servers are configured for a branch to deploy user VMs and branch management software.
3. Cabinets, switches, and NAS devices are optional.
4. Only management data is transmitted between the headquarters and the branches through the network. Local traffic is used for VM remote desktops. This eliminates the need for network bandwidth. The bandwidth required is less than 2 Mbit/s, and the delay is less than 120 ms.
5. Service and management data is transmitted over the local area network (LAN) of branches.

Table 4-1 lists network requirements of branches.

Table 4-1 Network requirements

Network Port	Type	GE electrical port
	Quantity	4 for each server. 8 in total.
	VLAN	1 for the management plane and 1 for the service plane
Network Status	Bandwidth	300 kbit/s x *N* (*N* specifies the number of desktops, and 300 kbit/s is average desktop value.)
	Delay	≤ 25 ms
	Packet loss rate	≤ 0.1%
	Jitter	≤ 5 ms

4.1.3 Software Deployment

Figure 4-3 Remotely modularized branch software deployment

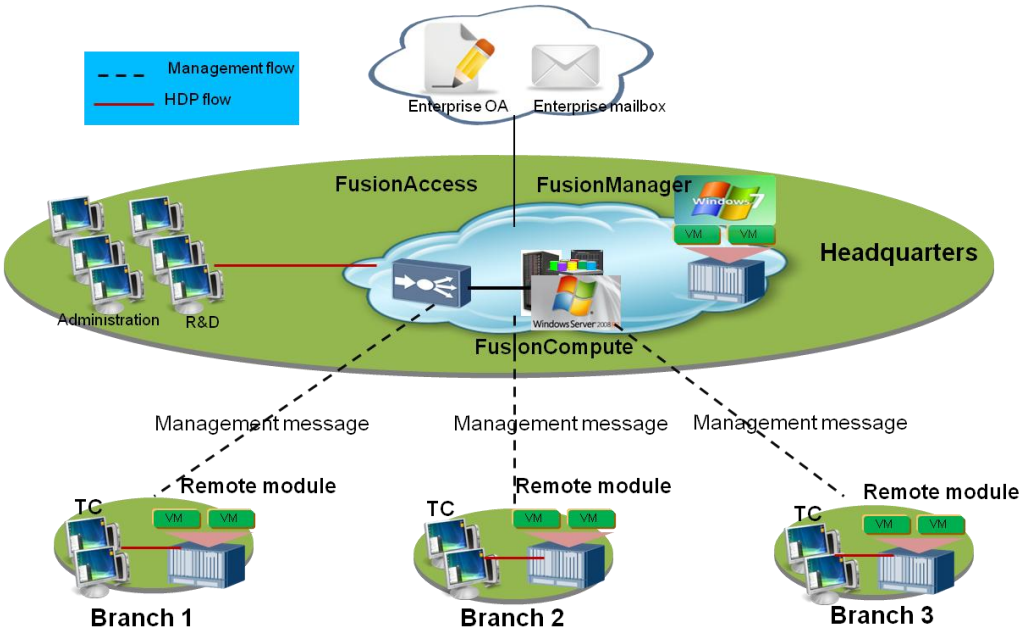
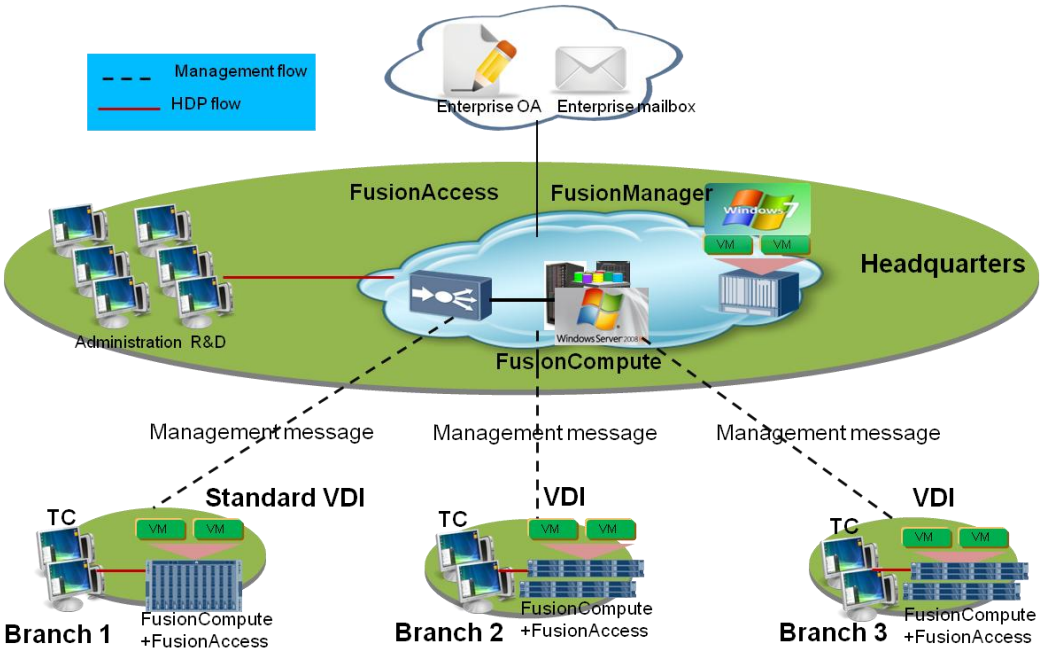


Figure 4-4 Software deployment for distributed and integrated branches



Integrated VDI software deployment for branches:

1. To ensure unified management at headquarters, the FusionAccess, FusionManager, and FusionCompute must be deployed at headquarters.
2. a. Remotely modularized deployment: Branches are directly managed by the headquarters without installing any management software. b. Distributed and integrated deployment: To manage branches in the headquarters while retaining independency for each branch, FusionAccess and FusionCompute are deployed in each branch.

The FusionManager deployed in the headquarters provides a centralized operation and maintenance (O&M) management portal to centrally monitor and manage hardware resources, virtualization resources, and FusionCloud desktop systems of branches. The FusionManager deployed in the headquarters provides a centralized O&M management portal for FusionCloud desktops. It supports quick service provisioning, desktop management, and resource statistics for multiple branches.

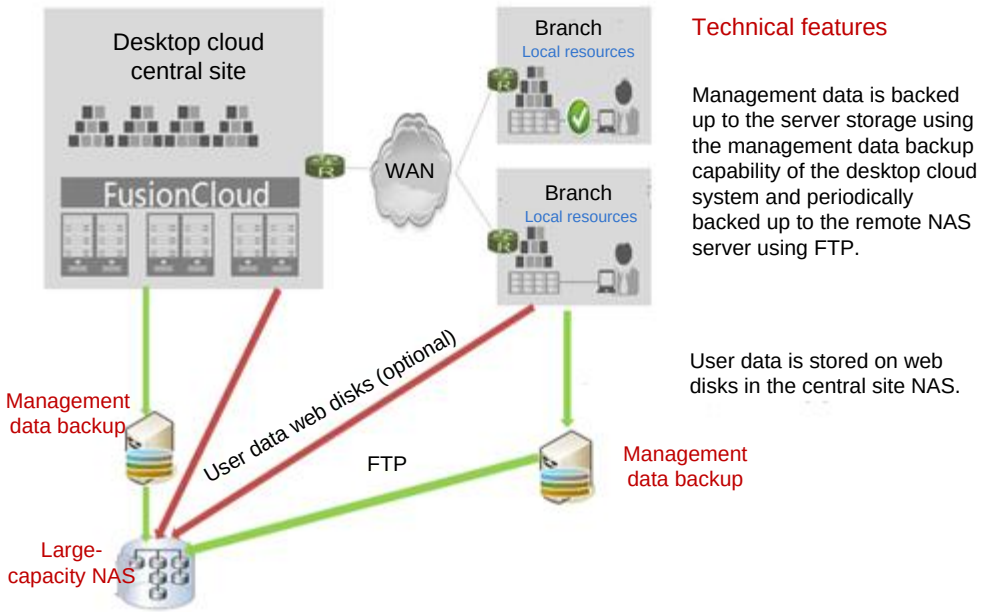
4.1.4 Specifications

General Specifications
Number of VMs supported by a FusionAccess system: ≤ 20,000
Number of VMs supported by a FusionCompute system: ≤ 5,000 (5.0 or earlier) ≤ 10,000 (5.1) Number of logical or resource clusters supported by a FusionCompute system: ≤ 32
Number of VMs supported by a FusionManager system: ≤ 80,000 Maximum number of FusionCompute systems that can be connected to a FusionManager system: ≤ 256 Maximum number of FusionAccess systems that can be connected to a FusionManager

system: ≤ 256
Specifications for Distributed and Integrated VDI Deployment
Number of branches supported by a FusionManager system: ≤ 256 (including the headquarters)
Management bandwidth between FusionManager and FusionCompute: ≥ 3 Mbit/s Management bandwidth between FusionManager and FusionAccess: ≥ 2 Mbit/s
Management bandwidth between the headquarters and branches: ≥ 5 Mbit/s (3 + 2)
Specifications for Remotely Modularized VDI Deployment
Number of branches supported by a FusionCompute system: ≤ 32 (including the headquarters)
Number of branches supported by a FusionManager system: ≤ 256 x 32 (including the headquarters)
Management bandwidth between FusionCompute and a branch cluster: ≥ 3 Mbit/s
Management bandwidth between the headquarters and branches: ≥ 3 Mbit/s

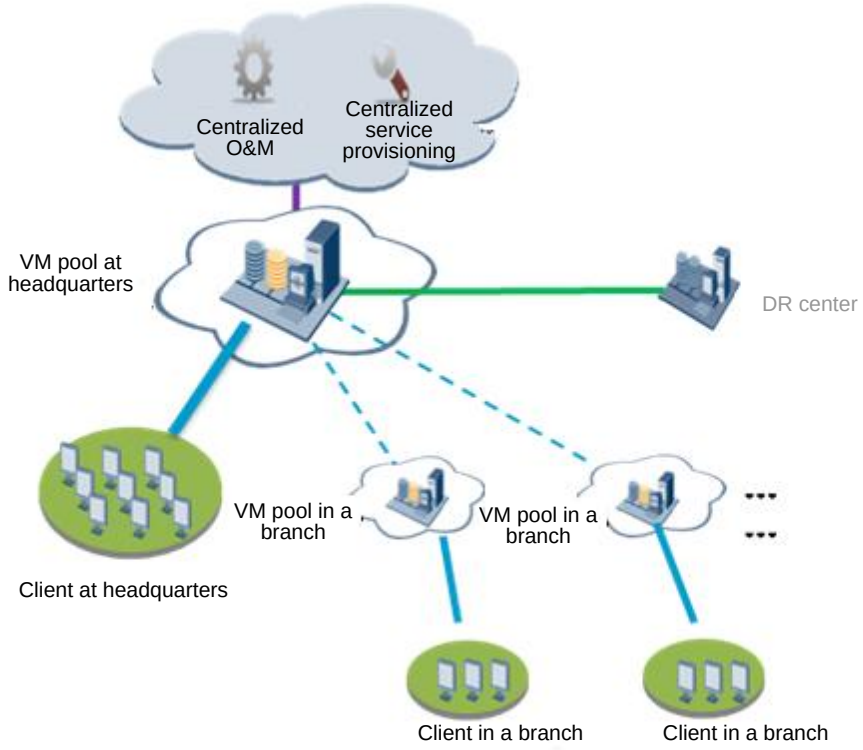
4.1.5 Data Backup

Figure 4-5 Data backup for distributed and integrated branches



4.1.6 Application Scenarios

Figure 4-6 Application scenarios



Application scenarios of integrated VDI deployment branches:

1. The network bandwidth of the enterprise headquarters and branches is low, so that a data center cannot be deployed at headquarters. To connect branches to FusionCloud desktop systems through remote TCs, FusionCloud desktop systems must be deployed at branches.

NOTE
When each user accesses FusionCloud desktop systems, 300 kbit/s (reference value) is required.

2. There is a long distance between the headquarters and the branches, and the network delay is long, so that branches cannot connect to FusionCloud desktop systems through remote TCs. Therefore, FusionCloud desktop systems must be deployed at branches.

NOTE
To ensure good user experience, the delay is less than 25 ms, the Jitter is less than 5 ms, and the packet loss rate is less than 0.1%.

3. To decrease requirements of branch maintenance manpower and skills, service maintenance and provisioning are centrally implemented at headquarters, while branch personnel perform some operations on hardware.

4.2 Centralized Management for Integrated VDI Deployment

4.2.1 Portal Integration

Figure 4-7 Integration with FusionCompute

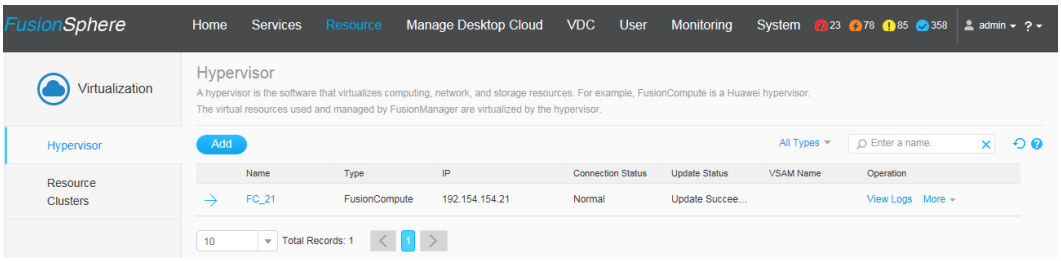


Figure 4-8 Integration with FusionAccess

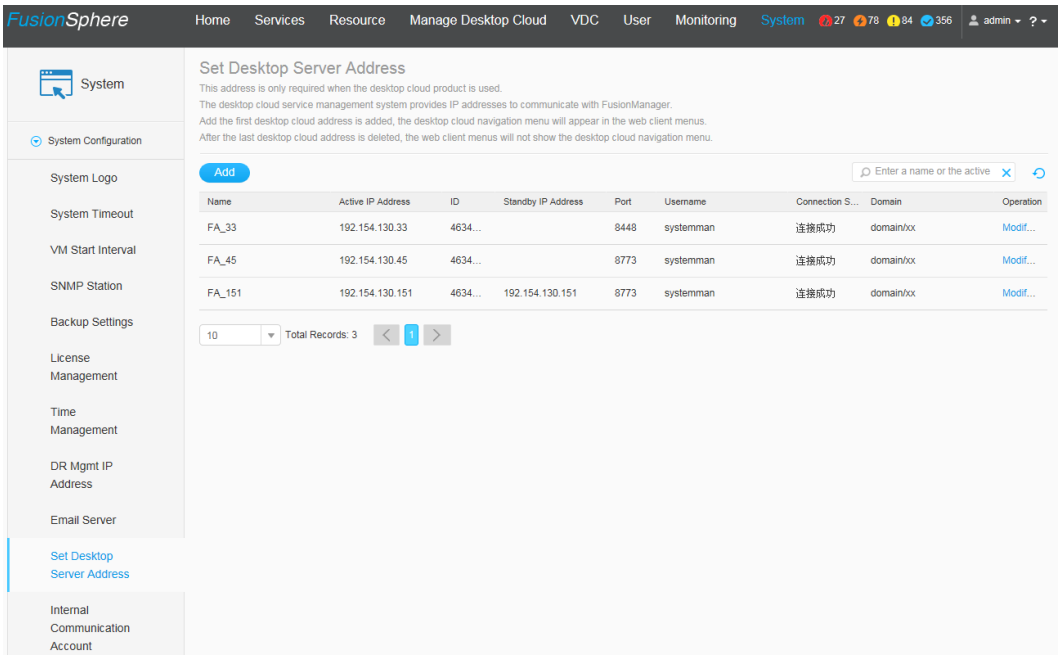
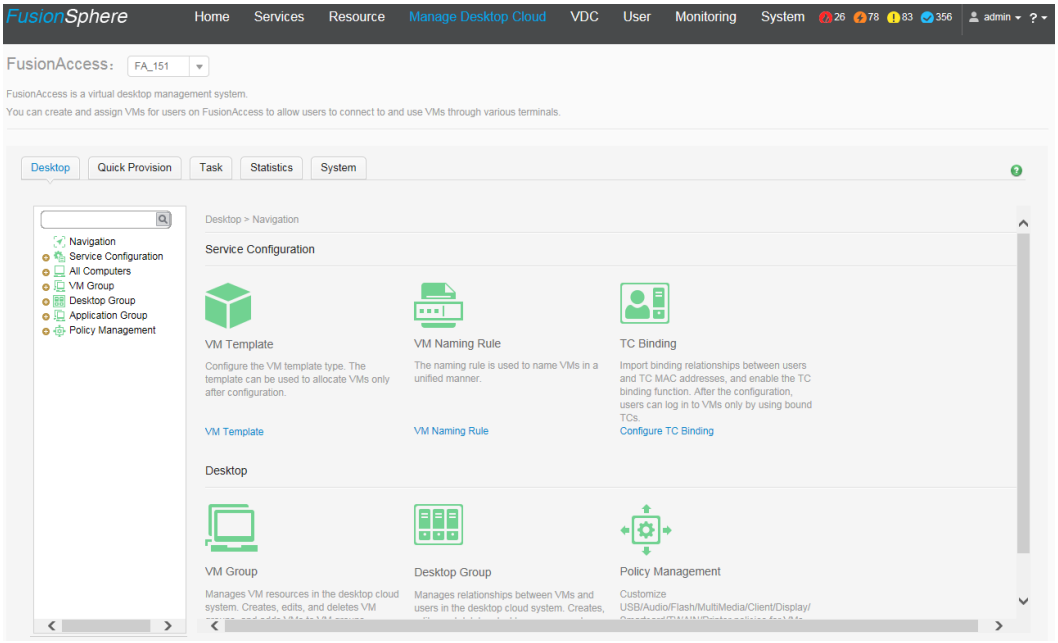


Figure 4-9 Switching to FusionAccess



4.2.2 Unified Desktop Management

Figure 4-10 Quick provisioning

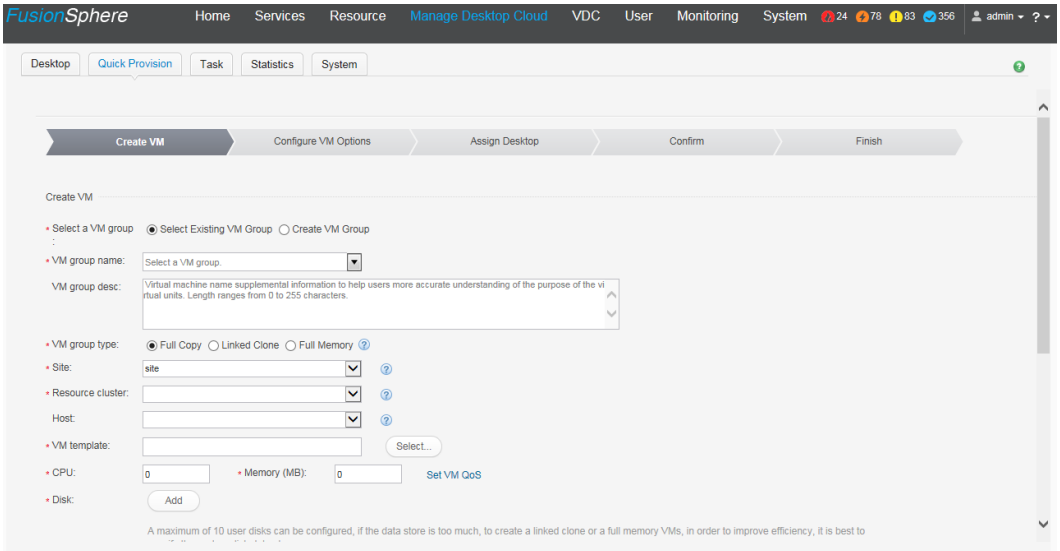


Figure 4-11 Task center

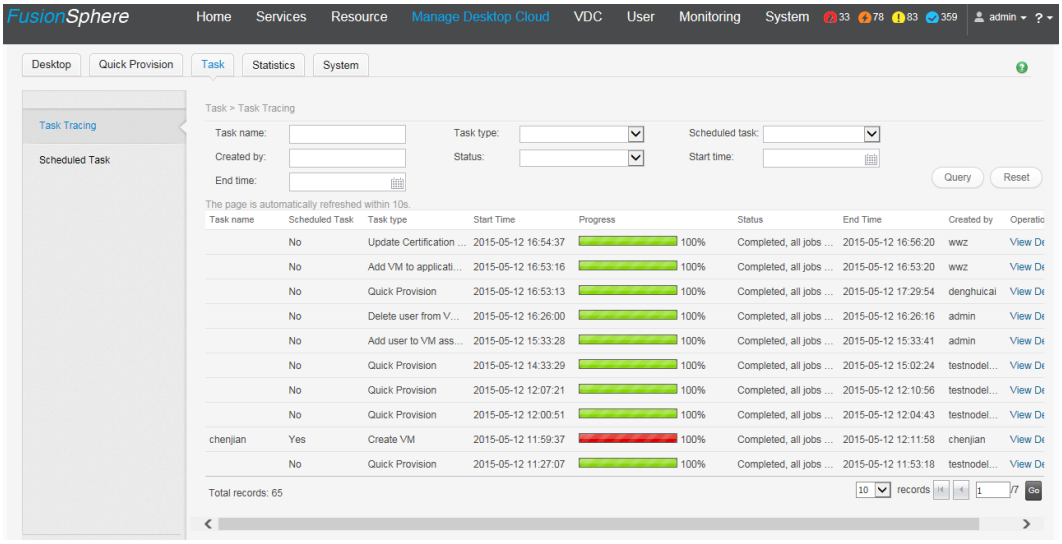


Figure 4-12 Desktop management

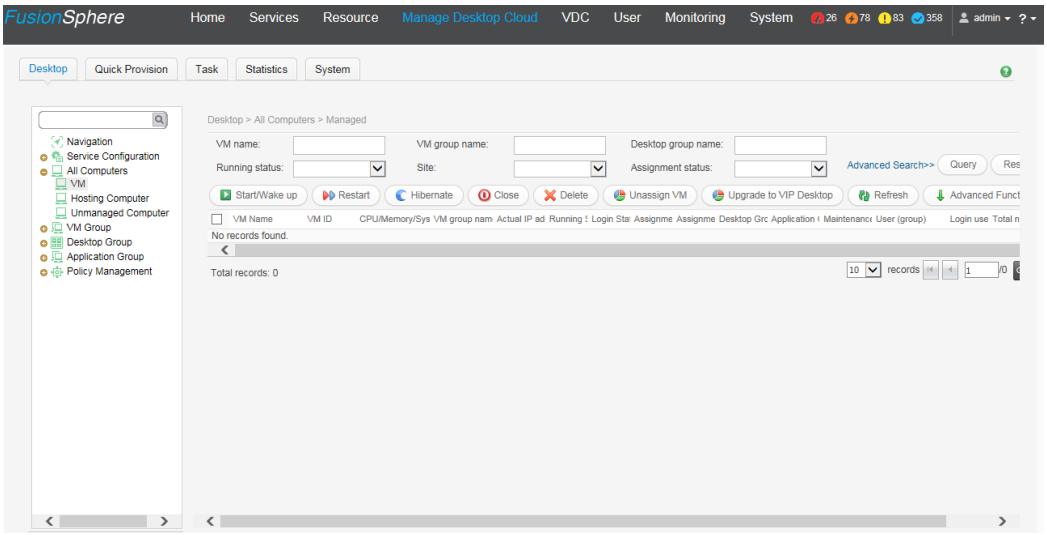


Figure 4-13 Resource statistics (1)

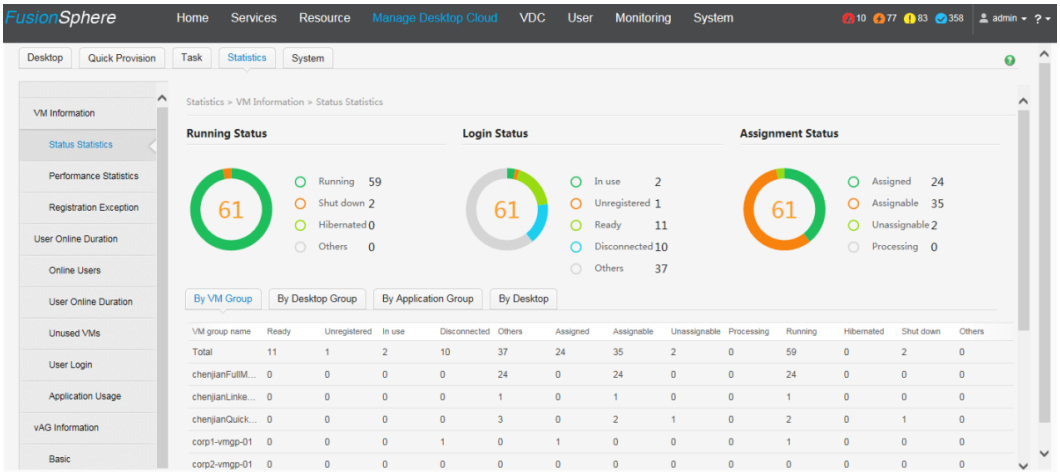


Figure 4-14 Resource statistics (2)

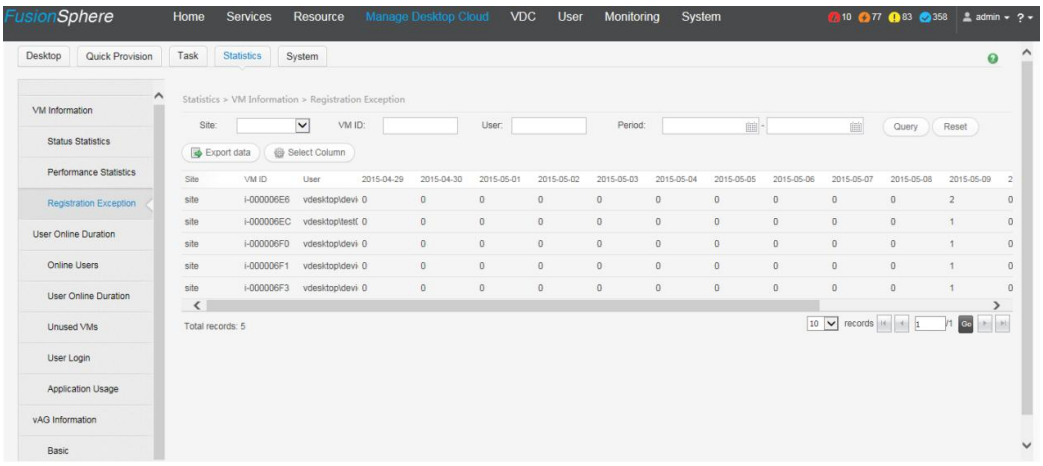


Figure 4-15 Resource statistics (3)

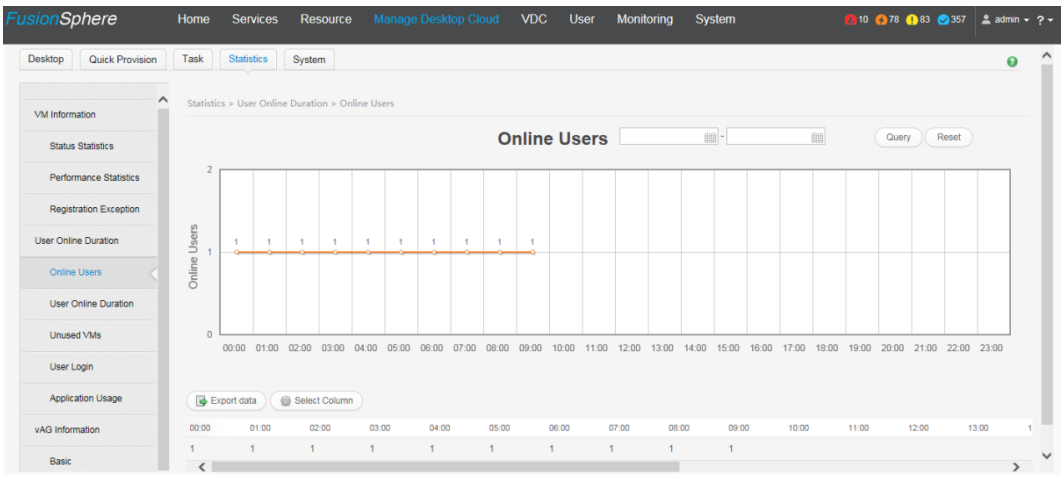


Figure 4-16 Resource statistics (4)

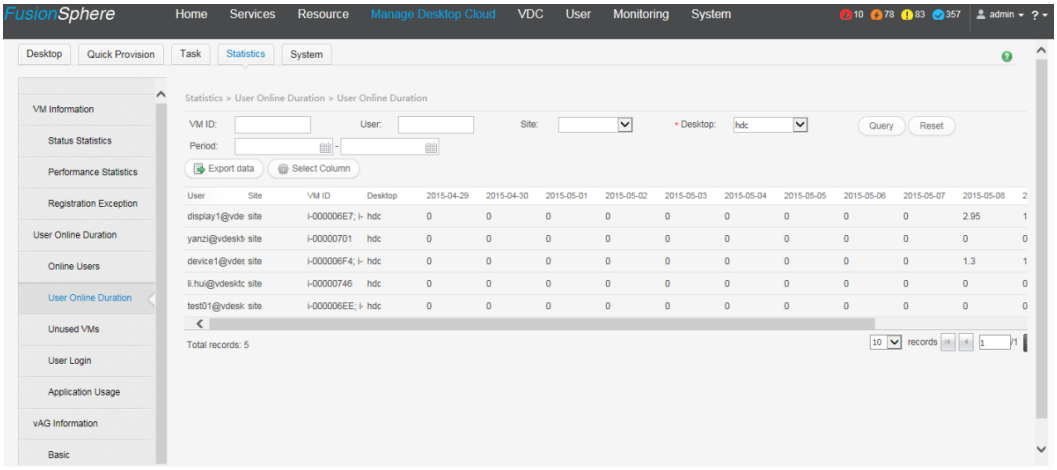


Figure 4-17 Resource statistics (5)

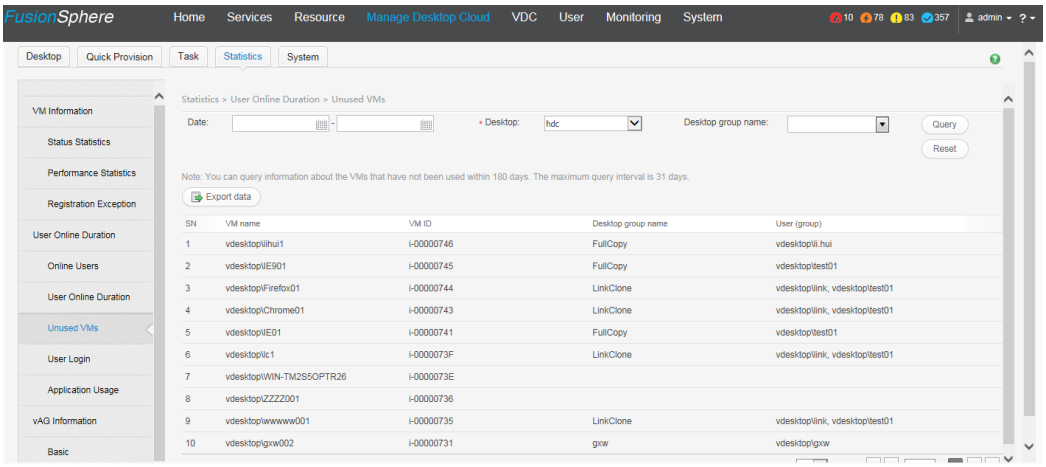


Figure 4-18 Resource statistics (6)

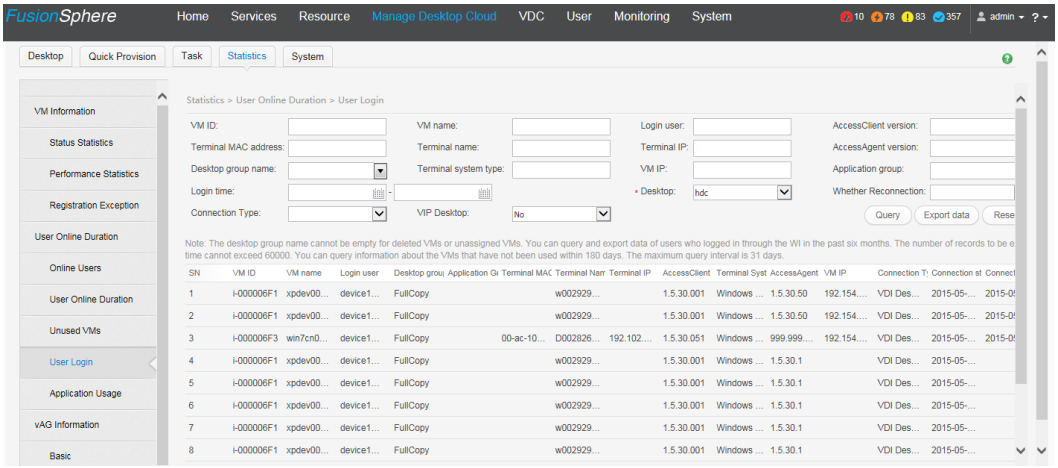


Figure 4-19 Resource statistics (7)

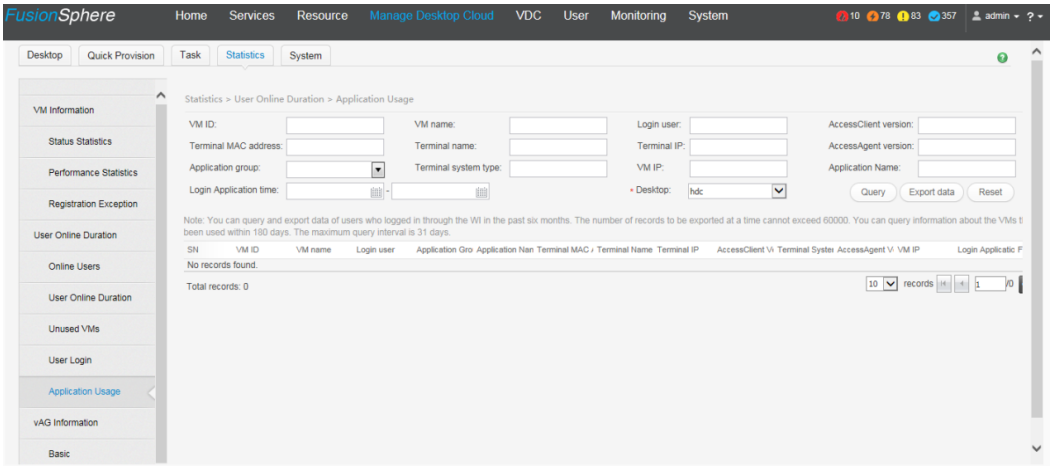
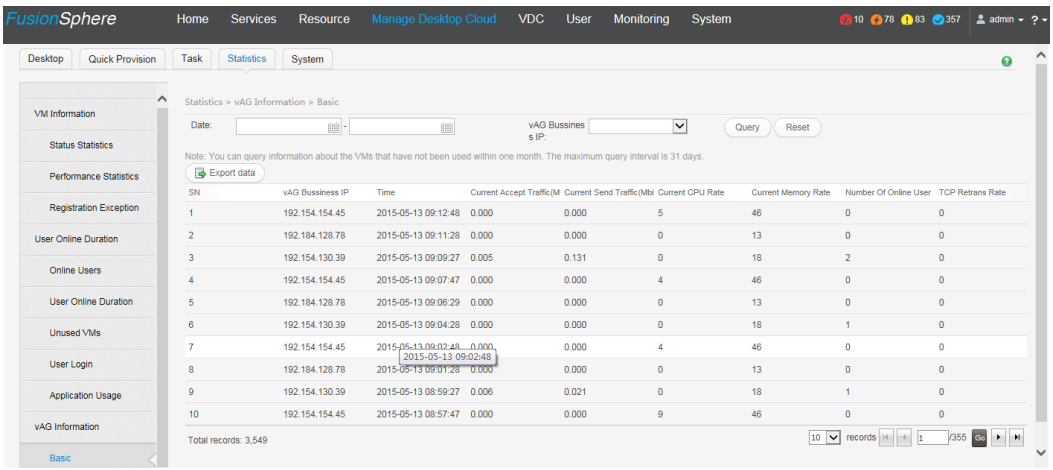
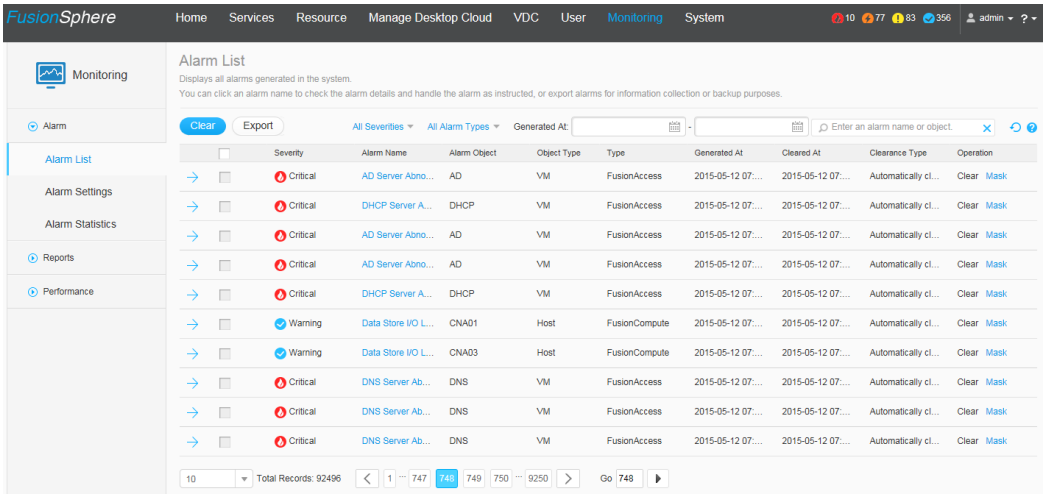


Figure 4-20 Resource statistics (8)



4.2.3 Unified Alarm Management

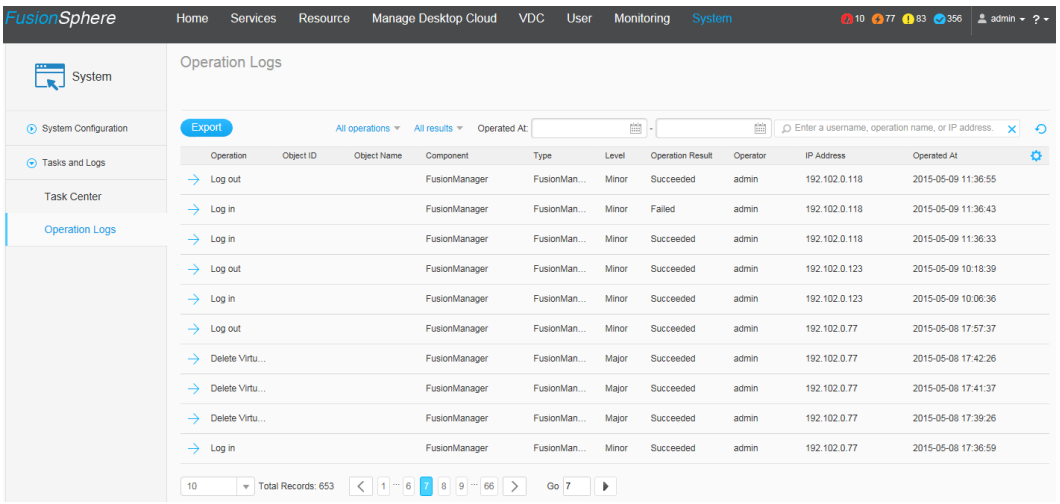
Figure 4-21 Unified alarm management



Virtualization management software FusionManager is deployed in the headquarters and integrates with desktop cloud software FusionAccess of each branch. On the FusionManager portal, administrators can implement unified alarm management, such as viewing, clearing, masking, and setting alarms and collecting statistics on alarms. Alarms include software and hardware alarms generated by virtualization platforms and alarms reported by FusionAccess of each branch.

4.2.4 Unified Log Management

Figure 4-22 Unified log management



Virtualization management software FusionManager is deployed in the headquarters and integrates with desktop cloud software FusionAccess of each branch. On the FusionManager portal, administrators can implement unified log management, such as viewing and exporting logs.

5 Branch Solution Selection

5.1 Bandwidth Requirements in Typical Scenarios

5.1.1 HDP Bandwidth Requirements of Applications

The required HDP bandwidth is closely related to user behavior. Table 5-1describes HDP bandwidth requirements of typical applications.

Table 5-1 HDP bandwidth requirements of typical applications

Category	Scenario	HDP Bandwidth	Percentage (Example)
Silence	No application running	4 kbit/s	15%
	Microsoft Office running	20 kbit/s	20%
Office applications	Word	45 kbit/s	25%
	PPT	829 kbit/s	10%
Other applications	PDF	499 kbit/s	5%
	Internet Explorer	150 kbit/s	20%
	Browsing pictures	123 kbit/s	5%

Based on data provided in Table 5-1, the required HDP bandwidth of a user is calculated as follows:

Required HDP bandwidth of a user = (4 kbit/s x 15% + 20 kbit/s x 20% + 45 kbit/s x 25% + 829 kbit/s x 10% + 499 kbit/s x 5% + 150 kbit/s x 20% + 123 kbit/s x 5%) = 160 kbit/s

5.1.2 HDP Bandwidth Requirements in Typical Office Scenarios

Based on the preceding calculation result, Table 5-2 provides the HDP bandwidth requirements of a user in typical office scenarios.

Table 5-2 HDP bandwidth requirements of a user in typical office scenarios

Default Windows and ITA Policy Settings		
Office Scenario	**HDP Bandwidth**	**Remarks**
SBC office	30 to 60 kbit/s	Typical office applications are run. Videos and 3D graphics processing are not required. Most of time is spent on local applications.
Basic office	150 to 300 kbit/s	Typical office applications are run. Videos and 3D graphics processing are not required.
Multi-screen 3D office	800 to 1200 kbit/s	Multiple monitors are used to play PowerPoint slides, browse pictures, and run 3D, Aero, and Office 2010 software.
480p video	4000 to 6000 kbit/s	The required bandwidth is determined by the frame rate and video type.
Optimized Windows Desktop Settings and ITA Policies (Such as Reduced Frame Rate and Lossy Policy)		
Office Scenario	**HDP Bandwidth**	**Remarks**
SBC office	20 to 40 kbit/s	Typical office applications are run. Videos and 3D graphics processing are not required. Most of time is spent on local applications.
Basic office	80 to 150 kbit/s	Typical office applications are run. Videos and 3D graphics processing are not required.
Multi-screen 3D office	500 to 800 kbit/s	Multiple monitors are used to play PowerPoint slides and run 3D, Aero, and Office 2010 software.
480p video	2000 to 3000 kbit/s	The required bandwidth is determined by the frame rate and video type.

5.1.3 Total HDP Bandwidth

In addition to the HDP bandwidth requirements in the office scenarios, the total HDP bandwidth is related to factors provided in Table 5-3. Take the following factors into consideration when calculating the total HDP bandwidth.

Table 5-3 Factors affecting total HDP bandwidth

Percentage of Users in Each Office Scenario	Because of different work properties and types, you need to take the percentage of users in each office scenario into consideration, for example, the percentage of users in the multi-screen 3D office scenario.
Reserved Minimum Peak Bandwidth	The actual bandwidth is closely related to users' operations. When a user zooms in or out a window or opens a file, network traffic may burst. To ensure user experience, you need to reserve a peak bandwidth in the total HDP bandwidth to support the burst traffic. Usually, a minimum peak bandwidth 0.5–1 time the total bandwidth is reserved.
Network Utilization	The network utilization is usually less than 80%.
For example, an enterprise has 100 employees. 90% of the employees work in the basic office scenario, 8% in the multi-screen 3D office scenario, and 2% in the 480p video scenario. The required total HDP bandwidth is calculated as follows: Total HDP bandwidth (optimized) = (100 kbit/s x 90% + 800 kbit/s x 8% + 3000 kbit/s x 2%) x 100 (number of employees) x 1.5 (reserved bandwidth)/80% (network utilization) = 40125 kbit/s = 40 Mbit/s	

5.2 Branch Solution Selection

Table 5-4 Comparisons between branch deployment modes

<table>
<tr><th colspan="3">Centralized Deployment (Recommended)</th></tr>
<tr><td>Feature</td><td colspan="2">• A data center is constructed in the headquarters to centrally deploy all servers, storage devices, network devices, and management systems, including FusionCompute, FusionAccess, and FusionManager (optional).
• In the VDI scenario, only TCs are deployed in branches, and branch users remotely log in to virtual desktops deployed in the headquarters data center. In the SBC scenario, branch users use PCs to remotely access virtual applications deployed in the headquarters data center.</td></tr>
<tr><td></td><td>Advantages</td><td>• The headquarters implements centralized management.
• Templates are centrally created in the headquarters data center and used to centrally provision virtual desktops or manage, publish, and update applications.</td></tr>
<tr><td></td><td>Constraints</td><td>When the network between branches and the headquarters is interrupted, branch users cannot use virtual desktops or virtual applications. (Solution: Improve the WAN reliability.)</td></tr>
<tr><td>Network Conditions</td><td colspan="2">• WAN bandwidth requirements
– VDI: ≥ 300 kbit/s x N (N indicates the number of branch users. 300 kbit/s is an average bandwidth. For details about how to calculate bandwidth in a specific scenario, see section 5.1.2 "HDP Bandwidth Requirements in Typical Office Scenarios.")
– PC+SBC: ≥ 30 kbit/s x N (N indicates the number of branch users. 300 kbit/s is an average bandwidth.)
• WAN quality
– Recommended network quality: latency ≤ 30 ms; packet loss rate: ≤ 0.01%; jitter ≤ 10 ms
– Minimum requirements: latency ≤ 50 ms; packet loss rate: ≤ 0.1%; jitter ≤ 10 ms
• A single point of failure (SPOF) must be prevented on the WAN. The WAN reliability can be improved by leasing lines from different carriers.</td></tr>
<tr><td colspan="3"></td></tr>
</table>

Distributed Deployment		
Feature	• Data centers are separately constructed in the headquarters and branches to deploy required servers, storage devices, network devices, and management systems, including FusionCompute and FusionAccess. • Users log in to local virtual desktops using TCs deployed in branches.	
	Advantages	• Each branch independently manages its data center. • Each branch independently creates templates and provisions virtual desktops. • Management systems adopt the browser/server (B/S) architecture. When network conditions are met, administrators can remotely log in to the management systems of each branch from the headquarters to implement partial centralized management.
	Constraints	Each branch needs to hire IT support personnel to maintain hardware devices and management nodes.
Network Conditions	• WAN bandwidth ≤ 2 Mbit/s (2 Mbit/s is management bandwidth.) • WAN quality: latency ≥ 120 ms; packet loss rate: ≥ 0.5%; jitter: ≥ 50 ms • The WAN is unreliable, and SPOF often occurs.	
Remotely Modularized Deployment		
Feature	• A data center is constructed in the headquarters to deploy some servers, storage devices, and network devices, and all management systems, including FusionCompute, FusionAccess, and FusionManager. Each branch deploys its own servers, storage devices, and network devices, which are centrally managed by the management systems in the headquarters as a logical cluster. • Branch users remotely log in to the desktop cloud in the headquarters using local TCs for authentication and connect to local virtual desktops. (In this mode, an AG is not allowed to be deployed.)	
	Advantages	• Branches are centrally managed in the headquarters. • Templates are centrally created in the headquarters and used to provision virtual desktops for branches.

	Constraints	• When the network between branches and the headquarters is interrupted: – If a branch user has logged in to a virtual desktop, the user can still use the virtual desktop. – A user cannot log in to a virtual desktop. If the virtual desktop is not stopped and the user knows the IP address of the virtual desktop, the user can log in to the virtual desktop in direct connection mode using Remote Desktop Protocol (RDP). – The headquarters cannot monitor desktops of branches or provision desktops for branches. (Solution: Improve the WAN reliability.) • Each branch needs to hire IT support personnel to maintain hardware devices.
Network Conditions	• WAN bandwidth: ≥ 3 Mbit/s + N x 2 kbit/s (3 Mbit/s is management bandwidth. *N* indicates the number of desktops. 2 kbit/s is the average bandwidth used for desktop registration, heartbeat, and user login data exchange between VMs and HDCs. • WAN quality: latency ≤ 100 ms; packet loss rate: ≤ 0.3%; jitter: ≤ 40 ms • SPOF must be prevented on the WAN. The WAN reliability can be improved by leasing lines from different carriers.	
Distributed and Integrated Deployment (Recommended)		
Feature	• Data centers are separately constructed in the headquarters and branches to deploy required servers, storage devices, network devices, and management systems, including FusionCompute and FusionAccess. FusionManager is deployed in the headquarters for portal integration. • Users log in to local virtual desktops using TCs deployed in branches.	
	Advantages	• FusionAccess portals of branches can be integrated into FusionManager in the headquarters to implement centralized management. • If the data center in the headquarters fails or the network between the headquarters and branches is interrupted, local desktop services are not affected, meeting centralized management and local maintenance requirements. • Each branch independently creates templates and provisions virtual desktops. Templates can also be centrally created in the headquarters and used to provision virtual desktops for branches.

	Constraints	• When the network between branches and the headquarters is interrupted, the headquarters cannot provision virtual desktops for branches, and each branch needs to provision virtual desktops. • A set of management software is deployed in each branch, which increases costs and maintenance workloads. Each branch needs to hire IT support personnel to maintain hardware devices and management nodes.
Network Conditions	• WAN bandwidth ≥ 5 Mbit/s (The management bandwidth between FusionManager and FusionCompute is 3 Mbit/s, and the management bandwidth between FusionManager and FusionAccess is 2 Mbit/s.) • WAN quality: latency ≤ 120 ms; packet loss rate: ≤ 0.5%; jitter: ≤ 50 ms • SPOF must be prevented on the WAN. The WAN reliability can be improved by leasing lines from different carriers.	

NOTE

- WAN quality requirements of different deployment modes in an ascending order: distributed deployment < distributed and integrated deployment < remotely modularized deployment < centralized deployment
- Centralized management capabilities of different deployment modes in an ascending order: distributed deployment < distributed and integrated deployment < remotely modularized deployment < centralized deployment
- Deployment complexity in an ascending order: centralized deployment < distributed deployment < distributed and integrated deployment < remotely modularized deployment
- Templates cannot be automatically delivered across FusionCompute systems. If multiple FusionCompute systems exist (for example, A and B systems exist), templates created on FusionCompute A must be exported and saved in a sharing file server and then imported to FusionCompute B

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6 Examples of Branch Application Scenarios

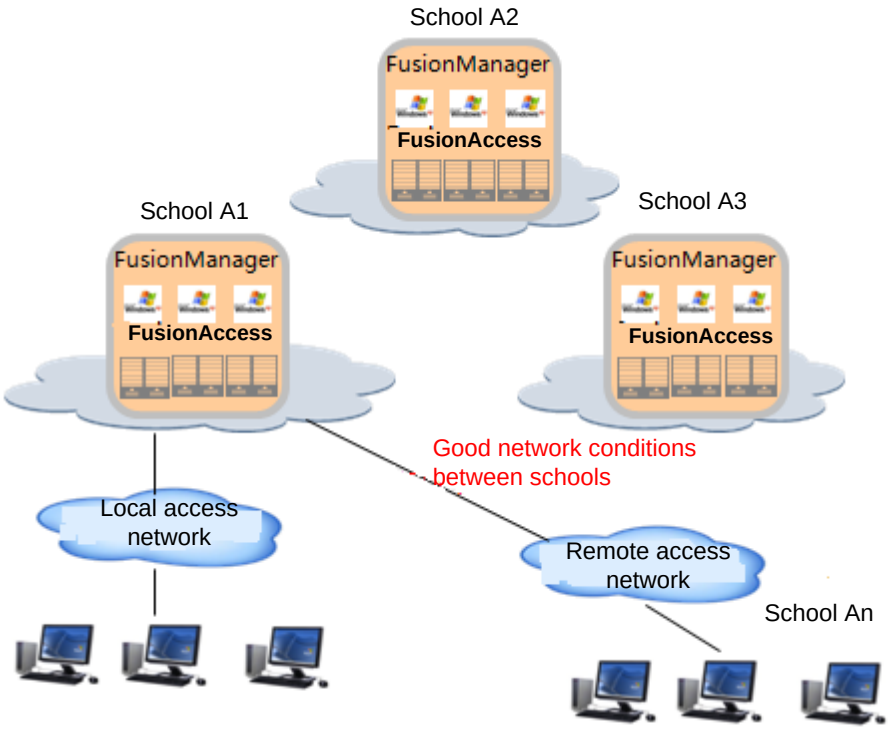
6.1 VDI Branch Application Scenarios

6.1.1 Education Industry

Conditions of customer networks vary. Urban networks are in good condition, while suburb networks are in poor condition. Some schools need to centrally manage resources of subordinate schools that are not capable of IT maintenance, including resource configuration and monitoring.

Networking scenario 1: An independent data center is constructed in each urban school (distributed branch solution).

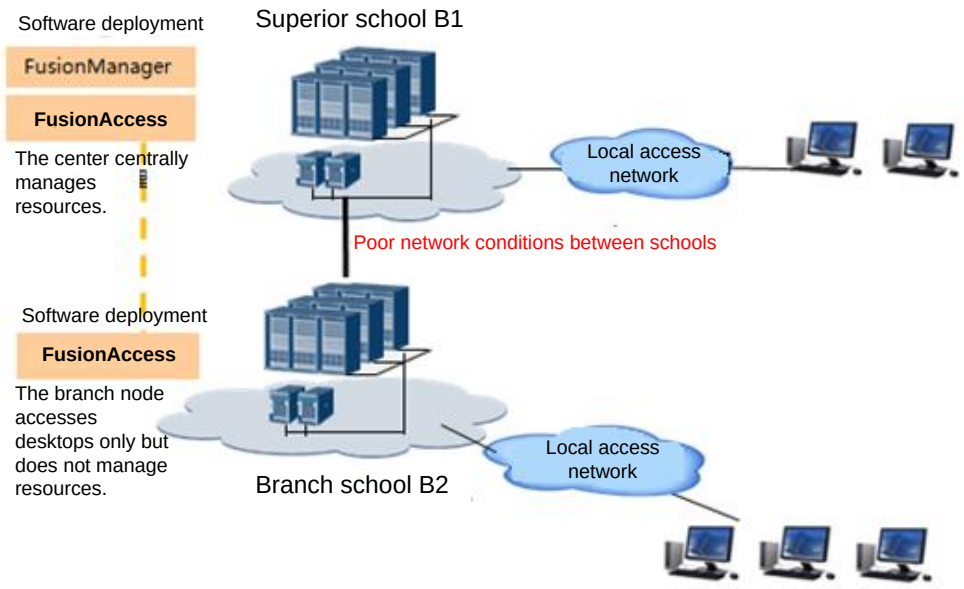
Figure 6-1 Distributed branch solution



- Network conditions
  - The average bandwidth per user is 250 kbit/s (Internet videos are not required).
  - The network quality is at least good, the packet loss rate is equal to or less than 0.1%, the round-trip latency is equal to or less than 50 ms, and jitter is equal to or less than 10 ms.
- Requirements and solutions
  - If hierarchical management is not required between schools, independently construct a data center in each school to manage desktop resources of the school.
  - If hierarchical management is required between the school headquarters and branches and network conditions between schools are good, implement remote access.
  - Deploy desktop cloud appliance based on RH2288H rack servers.
  - Each school has 300 to 500 or above users.

Networking scenario 2: The branch solution is deployed between urban schools (distributed and integrated branch solution).

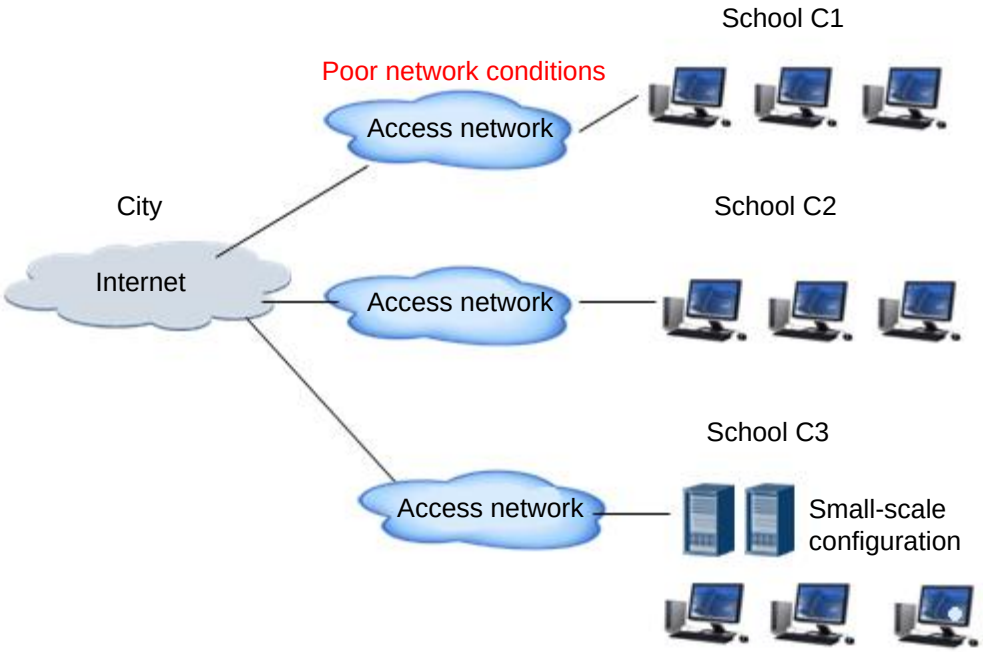
Figure 6-2 Distributed and integrated branch solution



- Requirements and solutions
  - Desktop resources must be centrally managed between superior and subordinate schools, and network conditions between schools are poor.
  - FusionManager is deployed in the data center of the superior school to manage desktop resources of the branch school. The branch school is responsible for local TC access only but does not manage desktop resources.
  - The management network bandwidth between the superior school and subordinate school is at least 2 Mbit/s.
  - Deploy standard architecture Server + SAN.
  - The branch school has 30 to 100 users.

Networking scenario 3: TCs or small-scale servers are deployed in suburb schools (centralized or remote modular branch solution).

Figure 6-3 Centralized or remote modular branch solution



- Requirements and solutions
  - Network conditions of suburb schools are poor.
  - Each suburb school usually has not more than 30 users.
  - Virtual desktops cannot be deployed with a limited budget.
  - TCs are directly deployed.
  - If the number of users ranges from 30 to 100, small-scale configuration mode is used. One or two servers are deployed to provision virtual desktops. (Resource pool HA is not supported, that is, VMs cannot be migrated.)

6.1.2 Large-granularity Combination (Hybrid Branch Solution)

Three-level deployment is implemented.

- Independent data center deployment: For schools in big cities where the access network is in good condition and the number of users exceeds 500, deploy the appliance platform + local TC access.
- Branch node deployment: For schools in small and medium cities where the access network is in poor condition and the number of users is about 100, deploy the standard architecture (server + SAN) + local TC access.
- Pure TC deployment: For suburb schools where the access network is in poor condition and the number of users is less than 30, deploy TCs or small-scale servers.

Figure 6-4 Three-level deployment