SANGFOR aDesk
Virtual Desktop Infrastructure

White Paper Ver 5.1

Sangfor Technologies Co., Ltd

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1. Background

In organizations, most users are using traditional PC for daily work. Operating systems, applications and data are stored locally in PC; thus, desktop will not work if any component fails. The biggest challenge IT management team faces now is endless launching of new desktop, software installation & update, and patch installation etc. The more PCs deployed, the more complexity IT team will be facing and more time & resource they need to invest in maintenance.

To solve the challenges above, Sangfor has launched its revolutionary aDesk VDI solution to improve data security, user experience, service consistence via leading VDI technology.

2. Challenges of Traditional PC

2.1 Operation and Maintenance

In traditional mode, staff’s work environment is fixed with PC. IT administrator needs to do troubleshoot onsite when PC fails, hence lots of time must be invested since this kind of job is frequently required in PC lifecycle. In addition, since desktop maintenance takes time so it comes with slow response and user complain.

Furthermore, PC lifecycle is only 3-4 years, which means this kind of complicated maintenance will be repeating. That’s why nowadays IT department is aiming to improve desktop management as IT environment gets more and more complex.
2.2 High TCO

In terms of total cost of ownership, PC is not the lowest, considering OPEX including configuration of OS and applications, installation & update of applications, daily maintenance, etc.

Moreover, power consumption and air conditioning are becoming a big part of OPEX as PC quantity increases. For instance, average power consumption of PC is 200W, with additional 50W for monitor, one PC will consume 250w*9hrs*264 days = 594kw power per year.

2.3 Data Security

Data risk with PC is very high as all data is stored locally. In addition, peripheral devices are hard to manage, critical data can be easily copied. With increasing data leakage, IT department needs put more efforts on how to prevent such incidents.

2.4 Fixed Working Place

With the trend of everything going mobile, staff want to access desktop, applications, data anywhere from any device. However, mobility is hard to realized with traditional PC since desktop is fixed, which negatively affects user experience and work efficiency. Hence, IT department needs consider how to implement mobile office when implementing desktop solution.
3. Sangfor aDesk VDI Solution

3.1 Technical Accumulation

Sangfor has a long history in virtualization product development. In 2011 Sangfor launched application virtualization product EasyConnect so users could access application remotely. In the same year, Sangfor developed SRAP high speed transmission protocol to enhance desktop transmission between server and client, dramatically improved user access experience; following on, Sangfor launched Virtual Secured Platform (VSP) and Secured Desktop (SD). All those products help Sangfor build a solid base on virtual desktop infrastructure product.

In 2013, Sangfor launched the end-to-end VDI solution “aDesk”, including server virtualization, desktop virtualization, storage virtualization, server and Thin Client PC.

3.2 aDesk Architecture

To solve the distributed desktop management issue, aDesk centralizes desktop resources to backend server, so users can access this “desktop” with any device from anywhere.
Sangfor aDesk provides one-stop, cost effective VDI solution, the only hardware required are Thin Client PC and server (all software is converged into one pack).

Virtual Desktop Server (VDS) is designed for aDesk. It deeply integrates with server virtualization, storage virtualization and desktop virtualization (VDC controller). No complicated installation & configuration are required. Sangfor aDesk achieves “Power on = Service on” with a simple configuration and intuitive wizard.

### 3.3 Components

**Hardware**

a) Thin Client PC (aDesk)

**ARM Processor:** Powered with ARM A9 CPU, it provides better system efficiency and stability.

**Long Lifecycle:** Fully integrated design, with only 10-watt power consumption and lifecycle of 5-8 years.

---

*Your One-Stop Solution for Network Security & Cloud Computing*

Sangfor Technologies  
T.: +60 12711 7129 (7511) | E.: sales@sangfor.com | W.: [www.sangfor.com](http://www.sangfor.com)
Green: Power consumption is only 10% of that of PC, no fan, no noise.

b) Integrated Server (VDS)

VDS (Virtual Desktop Server) is specifically designed for Virtual Desktop Infrastructure. With pre-installed software, VDS is extremely easy to set up and deploy.

<table>
<thead>
<tr>
<th>Traditional Server</th>
<th>Sangfor VDS</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent storage (Expensive)</td>
<td>Virtual Storage (High performance, cost effective)</td>
<td>Save storage cost</td>
</tr>
<tr>
<td>HDD Disk (Low cost, low IOPS)</td>
<td>Hybrid SSD+HDD (SSD for caching, high IOPS, low total cost)</td>
<td>Significantly improve IOPS and user experience</td>
</tr>
<tr>
<td>SSD Disk (High cost, high IOPS)</td>
<td>Only additional server required (no shut down, seamless expansion)</td>
<td>VDS is easier to expand</td>
</tr>
<tr>
<td>Shutdown for expansion (Complicated configuration)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cost Effective: Independent storage array is not required for Sanfor aDesk solution, since virtual storage component provides cost effective and high IOPS storage pool.

Best User Experience: Sangfor aDesk adopts hybrid SSD+HDD technology to provide balanced IOPS and cost solution. In advance with effective caching technology for hot content, aDesk build a solid foundation for best user experience.

Scalable: VDS requires no shutting down when adding more servers, and aDesk will automatically adjust and reallocate resources.

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High Availability: Sangfor aDesk delivers clustering architecture. With redundant design for nodes and disks, automatic failover migration, service is running without interruption.

Software

a) Virtual Desktop Controller (VDC): Integrate with user authentication, policy control, desktop/Thin Client PC monitor and management etc.

b) Virtual Machine Platform (VMP): This bare metal architecture provides management for desktop resource and load balance function, including VMs quick deployment, resource management & monitor, cluster HA, dynamic migration, data backup etc.

c) Virtual Storage (VS): Hard disks are virtualized into distributed shared storage. This technology delivers high availability via multi-copy mechanism, so data will be stored as several copies.
4. Solution Highlight

4.1 Ease of Use

4.1.1 SSO and Relatively Shut Down

Generally, users need to go through several rounds of authentication since each application and desktop require independent authentication; that affects work efficiency as a result. To improve user experience, Sangfor aDesk integrates Single Sign On (SSO) technology. It takes only 1-time authentication by integrating VDI authentication and OS authentication, after which users don’t need to authenticate again to virtual application and desktop.

More importantly, Sangfor aDesk realizes linked shutting down technology, one click can shut down both Thin Client PC and desktop.
4.1.2 Intuitive WEB Console

Traditional VDI solution needs various management consoles since the solution is provided by different vendors: Server, virtual desktop software, Thin Client PC. Sangfor aDesk integrates all components management into one single console. IT administrator can quickly configure the entire virtual desktop environment and monitor key components status (CPU, RAM, storage, network etc.). This substantially helps IT administrator simplify VDI management.

4.2 Best User Experience

4.2.1 SRAP Transmission Protocol

Desktop transmission protocol is the most important part since all desktop images need to be transferred via network. Based on long term development of network optimization, Sangfor launched SRAP (Sangfor Remote Access Protocol) dedicated for
virtual desktop solution. Compared with RDP protocol, SRAP has 6-time better transmission efficiency, with stream compression, intelligent data caching, dynamic image optimization technology, etc.

4.2.2 Video Redirection and Decoding

Traditional VDI decodes video stream at server side, and transfers video frame one by one to Thin Client PC. This method consumes lots of server resource, as well as network bandwidth. Sangfor redirects video stream to Thin Client PC, decodes stream by ARM chipset of Thin Client PC. This kind of video redirection and decode technology will dramatically improve video playing experience, furthermore, it reduces server load and increases VM deployment density as well.

4.2.3 Caching Acceleration

When users access applications, a significant amount of data is interacting between server and client. Among that, some repeated consume lot of hard disk IO. Sangfor adopts “Caching Acceleration” technology, to cache hot content including cookies, webpages in RAM. It helps accelerate webpage speed up to more than 30% and decrease IO consumption down to at least 70%.
4.2.4 Comprehensive Terminal Supported

Users can access virtual desktop by Thin Client PC, PC, laptop, PAD, smartphone as long as network is connected. Furthermore, users can switch desktop between different terminals seamlessly. No previous operation will be affected during switching.

4.2.5 Peripherals Compatibility

Sangfor aDesk allows peripherals to connect to terminal, and driver installed on server; then local desktop connects with peripherals just like traditional PC. With “Zero bus” technology there is a dedicated tunnel established between server and terminal for command transmission, from scanner, camera, keyboard, card reader, printer, USB-key, etc.
4.3 TCO Deduction

4.3.1 Distributed Virtual Storage

Sangfor aDesk consolidates hard disks into a virtual storage pool by distributed Virtual Storage (VS) technology, and provides service to server virtualization platform (VMP). That means, virtual storage is actually virtualized by server attached HDD, and the VMs are stored in VS. Distributed architecture makes effective use of server hard disks.
4.3.2 SSD Caching Optimization

Sangfor improves access speed of hot content, by using “hybrid SSD+HDD” to cache hot content in high IO performance SSD. Server IOPS performance increases with more than 60% data cache ratio. HDD is used for personal data storage for its low IOPS performance and low cost.

4.3.3 Memory Page Combination

Hardware investment is a big part of total VDI solution. To cut that cost, Sangfor developed memory page combination technology. VMs use the same memory pages in VDS server, i.e.: OS execution code. Sangfor makes those pages shared between VMs to save physical memory space. Test approved this technology saves at least 20% of server cost.
4.3.4 ISO Segregation and IO Acceleration

Generally, virtual desktop and personal data is stored in dedicated separate storage space, even same Windows OS. To optimize that, Sangfor segregates OS, ISO and personal data, so ISO can be centralized managed and delivered. IT administrator only needs to maintain one OS template. Furthermore, in this way, multi desktops could share the same IO when OS start, to improve desktop start efficiency.

4.3.5 PC Reuse

If existing PC is still in its lifecycle, users tend to consider how to reuse it with VDI project. Sangfor aDesk supports reuse of existing PC. It converts PC into one “Thin Client PC” with only one plugin. It also realizes direct login without PC local desktop. And support switch to local desktop for specific use.

*Available in version 5.2
4.4 Security Design

4.4.1 Multi-Authentication Method

Authentication is critical technology for enterprise information security. Sangfor supports multiple authentication methods including local authentication, 3rd party integration, SMS, USB key, hardware ID, dynamic code etc. for different scenarios.
4.4.2 Personal Data Encryption

End user concerns of private information security since all data stored in centralized storage. Sangfor innovates with “personal data encryption” technology to encrypt personal data in server. Each data will be protected from illegal use.

5. aDesk Highlights

5.1 Solution Highlights

User Experience: IOPS & cache acceleration, SRAP transmission protocol improve VDI performance and user experience; video stream redirection, Thin Client PC codec technology makes video playing more fluent.

Deployment: Sangfor aDesk delivers end to end VDI solution with industry least components. 1 IT administrator is able to deploy whole VDI platform within one day.

Management: Sangfor aDesk converges all components management into one console, with intuitive wizard. It improves operation & maintenance efficiency by 10 times.
Security: Sangfor aDesk integrates with end to end security design, including multiple authentication, transmission HTTPS encryption, access control, personal data encryption etc.

5.2 Sangfor aDesk TCO Analysis

OPEX Saving: aDesk delivers much lower hardware failure rate and replacement cost, by consolidating massive PC into several servers; aDesk also saves 80% power consumption since Thin Client PC only consumes 10watt while PC 250watt.

Mobile Office: Desktop can be accessed by Thin Client PC, PC, laptop, Pad, smartphone etc.

TCO comparison between PC and VDI (1,000 Thin-Client PC deployment):

*source <PC vs Sangfor VDI-TCO comparison>
6. Hardware Specification

6.1 Thin Client PC

<table>
<thead>
<tr>
<th>Model</th>
<th>aDesk-STD-200H</th>
<th>aDesk-AIR-200H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>ARM Cortex A9 (4 core)</td>
<td>ARM Cortex A9 (4 core)</td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>1G</td>
<td>1G</td>
</tr>
<tr>
<td><strong>ROM</strong></td>
<td>4G</td>
<td>4G</td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>Ethernet</td>
<td>Ethernet wireless card</td>
</tr>
<tr>
<td><strong>USB Port</strong></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>VGA Interface</strong></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Serial Port</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Audio port</strong></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Dimension (L<em>W</em>H mm)</strong></td>
<td>127<em>127</em>25</td>
<td>127<em>127</em>25</td>
</tr>
<tr>
<td><strong>Max. Consumption</strong></td>
<td>24 watts</td>
<td>24 watts</td>
</tr>
<tr>
<td><strong>Average Consumption</strong></td>
<td>5 watts</td>
<td>5 watts</td>
</tr>
</tbody>
</table>
## 6.2 VDS Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>VDS-8050</th>
<th>VDS-6550</th>
<th>VDS-5050</th>
<th>VDS-3550</th>
<th>VDS-1350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>2U</td>
<td>2U</td>
<td>2U</td>
<td>2U</td>
<td>1U</td>
</tr>
<tr>
<td>CPU (Model)</td>
<td>2*E5-2682 V4 (16 core 2.5GHZ)</td>
<td>2*E5-2660 V3 (10 core 2.6GHZ)</td>
<td>2*E5-2630 V3 (8 core 2.4GHZ)</td>
<td>2*E5-2620 V3 (6core 2.4GHZ)</td>
<td>E3-1230 V3 (4 core 3.3GHZ)</td>
</tr>
<tr>
<td>RAM</td>
<td>256G</td>
<td>160G</td>
<td>128G</td>
<td>96G</td>
<td>32G</td>
</tr>
<tr>
<td>Storage</td>
<td>1<em>64G SSD, 1</em>480G SSD, 8*900G SAS</td>
<td>1<em>64G SSD, 1</em>240G SSD, 6*900G SAS</td>
<td>1<em>64G SSD, 1</em>240G SSD, 6*1T SATA</td>
<td>1<em>64G SSD, 1</em>120G SSD, 4*1T SATA</td>
<td>1<em>64G SSD, 1</em>120G SSD, 2*1T SATA</td>
</tr>
<tr>
<td>HDD Slot</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Network Interface</td>
<td>6<em>GE+2</em>10GE (optical)</td>
<td>6*GE</td>
<td>6*GE</td>
<td>6*GE</td>
<td>2*GE</td>
</tr>
<tr>
<td>Power</td>
<td>Redundant</td>
<td>Redundant</td>
<td>Redundant</td>
<td>Single Supply (optional redundant)</td>
<td>Single supply</td>
</tr>
</tbody>
</table>