

# SUNDE VDI Server-based Infrastructure Sizing

The number of users, intended application suite and overall performance expectation determine how powerful a host system must be in order to deliver the desired end-user experience. This paper provides high-level guidelines for determining the system requirements for various numbers of Diana VDI users with various computing workloads. These guidelines can be used as a starting point for sizing your deployment – but our strongest recommendation is to thoroughly evaluate expected workloads for your Virtual Machines (VMs) and expect to make some adjustments and fine tuning as your Diana virtual desktop deployment progresses.

## Understanding Virtual Desktop Workloads

Prior to deployment, you should develop use cases for the users you expect to connect to a host. An important consideration in developing use cases involves determining the number and types of applications users will need to operate. These requirements help you identify and measure the users' standard workloads. For example, you should measure the CPU, memory and storage utilization for a typical user workload in your environment. This workload data and the total expected number of users will help you determine the system requirements for your host system.

Light Workloads	<ul style="list-style-type: none"><li>● Task or knowledge workers running only 1 or 2 applications; i.e. a web browser or a billing application.</li><li>● Memory allocation of 768 MB (XP) to 1 GB (Windows 7) per VM .</li><li>● As many as 5 – 6 or more active VMs per core can be allocated.</li><li>● Storage system needs to provide roughly 30 IOPS per active user.</li></ul>
Medium Workloads	<ul style="list-style-type: none"><li>● Knowledge workers running multiple applications simultaneously, including Microsoft Office applications.</li><li>● Memory allocation of 1.5 GB (XP) to 2 GB (Windows 7) per VM.</li><li>● About 3 – 4 active VMs per core.</li><li>● Provide around 40 IOPS per active user.</li></ul>
Heavy Workloads	<ul style="list-style-type: none"><li>● Power users using scientific applications, high end graphics software development, or playing full screen video.</li><li>● Memory allocation of 2-3 GB or more per VM.</li><li>● Only 1-2 active VMs per core (1 active VM per AMD core or 2 active VMs per Intel Xeon core), 1 running thread utilizes 80% of a CPU core.</li><li>● As much as 50 IOPS per active user.</li><li>● For best performance, reserve as many resources as needed.</li></ul>

## Configuring the server and storage infrastructure

CPU	CPU load of a VM is highly dependent on the workload
	<ul style="list-style-type: none"> <li>● VMs per Core: 1 – 6</li> <li>● Typical VM load utilizes up to 20-30% of physical CPU, equal to 3-5 VMs per core</li> <li>● For medium workloads, allocating 3-4 VMs per core is recommended</li> <li>● 5-6 VMs may be allocated per core for lighter workloads</li> </ul>
Disk	Disk performance is important to VM responsiveness
	<ul style="list-style-type: none"> <li>● VMs per Disk (15K): 4 – 6</li> <li>● Both sufficient IOPS (30-50 per VM) and low latency (average read and write latency under 20 ms) required for optimal performance</li> <li>● Enterprise-level 15K SAS RAID supports 4-6 VMs / drive excluding parity drives</li> <li>● Lower performance disks may be used with fewer or less demanding VMs</li> <li>● Either direct attached storage (DAS) or iSCSI / FC SANs may be used</li> <li>● Large on-controller caches contribute greatly to storage performance</li> <li>● Test SAN accordingly, actual results vary depending on VM workloads</li> </ul>
Memory	Adequate VM memory ensures a positive individual user experience
	<ul style="list-style-type: none"> <li>● VM physical memory: 768 MB – 2 GB</li> <li>● Depending on workload and VM OS, 768 MB – 2GB should be allocated</li> <li>● Under-allocation of VM memory can result in Windows paging and over-burden the disk subsystem</li> <li>● Although not desirable, the total physical memory on server can be over-allocated</li> </ul>
Network	Low latency, high-bandwidth local-area network is key to deliver full desktop experience
	<ul style="list-style-type: none"> <li>● Standard 10/100 Mb/sec networks (i.e. Ethernet)</li> <li>● Video playback can result in higher bandwidth use. (e.g.: when playing online videos of lines below 200, each one consumes 100-200kb, when playing server-side videos, each 720p quality video consumes 5-6MB and 1080p quality ones use 20MB.)</li> <li>● Users working over internet may not get full desktop experience as in LAN due to the excessive latency and low bandwidth of most Wide-Area Networks</li> </ul>

## Recommended Host Hardware Configuration:

The table below gives recommended specifications for the host system, based on number of users and the type of applications used. We recommend you test your environment in advance of deployment to ensure it meets your expectations.

Diana(s)	For general office use (with occasional low quality video playback)			For high quality video playback			RAM size in Total		Storage	
	Server(s)	Type of CPU	CPU(s)	Server(s)	Type of CPU	CPU(s)	VM (Win XP/2003)	VM (Win7)	SSD	HDD
5	1	Intel i7(4 core) PC	1	1	Intel i7(4 core) PC	1	12G	16G	VM System	User Data
		Xeon 4core CPU (2.2Ghz or above)	1		Xeon 4core CPU (2.4Ghz or above)	1				
10	1	Intel i7(4 core) PC	1	1	Xeon 4core CPU (2.2Ghz or above)	2	16G	32G	VM System	User Data
		Xeon 4core CPU (2.2Ghz or above)	1							
15	1	Intel i7(4 core) PC	1	1	Xeon 4core CPU (2.4Ghz or above)	2	20G	32G	VM System	User Data
		Xeon 4core CPU (2.2Ghz or above)	1							
20	1	Xeon 4core CPU (2.2Ghz or above)	2	1	Xeon 6core CPU (2.2Ghz or above)	2	32G	48G	VM System	User Data
25	1	Xeon 4core CPU (2.2Ghz or above)	2	1	Xeon 6core CPU (2.4Ghz or above)	2	32G	64G	VM System	User Data
30	1	Xeon 4core CPU (2.2Ghz or above)	2	1	Xeon 8core CPU (2.0Ghz or above)	2	48G	64G	VM System	User Data
40	1	Xeon 4core CPU (2.4Ghz or above)	2	2	Xeon 6core CPU (2.0Ghz or above)	2	64G	96G	VM System	User Data

Note:

1. CPU recommendations are generation of processor or equivalent
2. RAM size per VM OS:
  - Win XP: 1G or above
  - Win 2003: 1G or above
  - Win 7: 1.6G or above
3. Storage size:
  - 10~20G for each VM OS. Storage for user data to be determined by actual usage. Storage configuration can be SSD (for VM OS) + HDD (for User Data), or SAS drives in RAID5 configuration.
4. OS for the Server:
  - Win7 x64 is workable, while Win2008R2 x64 is recommended more.

For the Diana access terminal, there is no limit of user number. The number of users a customer's installation will support depends upon the host's configuration and performance expectations of the customer. Performance results are highly dependent upon the individual VM memory, storage, OS, applications being used, and network conditions within any LAN/WAN. Host requirements will vary, please test your multi-user environment before deployment. For more information on supporting multiple simultaneous multimedia streams see the previous tables on this paper

This table is only a guideline; actual use may vary based on system utilization.

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For more information visit [www.sundenc.com](http://www.sundenc.com) or call 86 20 32290381 | 32290382 - 401N, 401O,401S, Building C, Software Park No.7, Caipin Road, Science City, Guangzhou, Guangdong, 510663, China

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