

# Microsoft & Citrix VDI, Better Together

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## 1. Introduction

The word VDI was primarily coined by VMware, where a desktop (OS & Application) is virtualized, to be precise, within a virtual machine, which eventually be running under a server hosting the virtual machine. In the past couple of years, some large organizations have turned to VDI as an alternative to the server-based computing model used by Citrix and Microsoft Terminal Services. Though independently not all virtual environment survived at all, a failure rate of 80% does not produce a beautiful scenario. But technology is getting smarter like every day, and we are adapting to it fast and making things happen where no one gone before.

The following screenshots will describe its merits:

## 2. Solution Requirements (Primary Design)

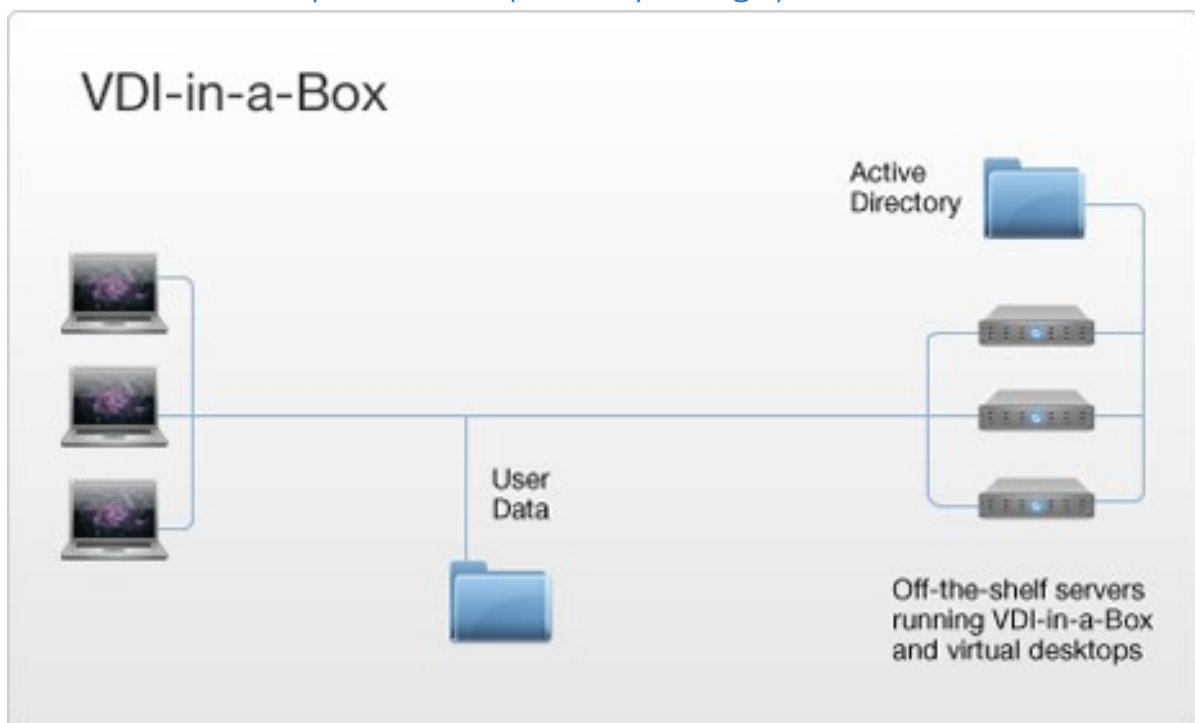


Figure 1 VDI Solution Scenario with Citrix

### 3. Microsoft's VDI Solution with Windows Server 2012

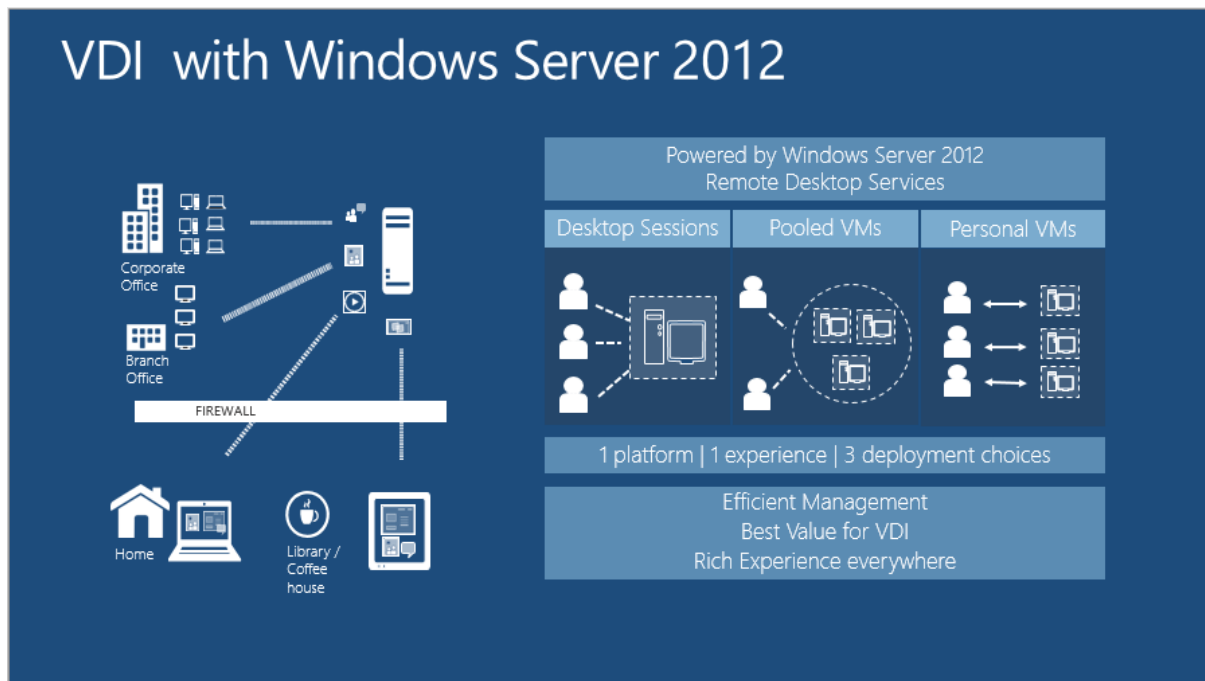


Figure 2 VDI Solution Scenario, Microsoft Windows Server 2012 R2

Microsoft Solution: if the above design is selected and a sole design is established that full Microsoft solution be provided; in this scenario there are three options available to establish successful VDI deployment.

In a single desktop virtualized environment where 1 VM is shared to multiple users, who accesses the application in it, and the total session is shared to multiple users at a time. In this scenario no user gets their personalized desktops, rather it will be a static desktop where only shared applications will be accessible.

In a pooled VM scenario, whatever the requirement, it gets integrated and works as a single instance of that multiple integrated VM. And multiple users can get access to it. Again in this scenario user personalization cannot be established.

The last option is that each user will use their own dedicated VM, where total personalization is addressed.

Microsoft addresses all three levels of access scenario for users to access their resource, and is efficient, and users will get a rich experience of resource usage.

Here is something more to read on:

Microsoft Desktop Virtualization: Taking another step forward with UE-V and VDI:  
<http://blogs.windows.com/windows/b/business/archive/2012/09/06/microsoft-desktop-virtualization-taking-another-step-forward-with-ue-v-and-vdi.aspx>

## 4. RDS Component Requirements

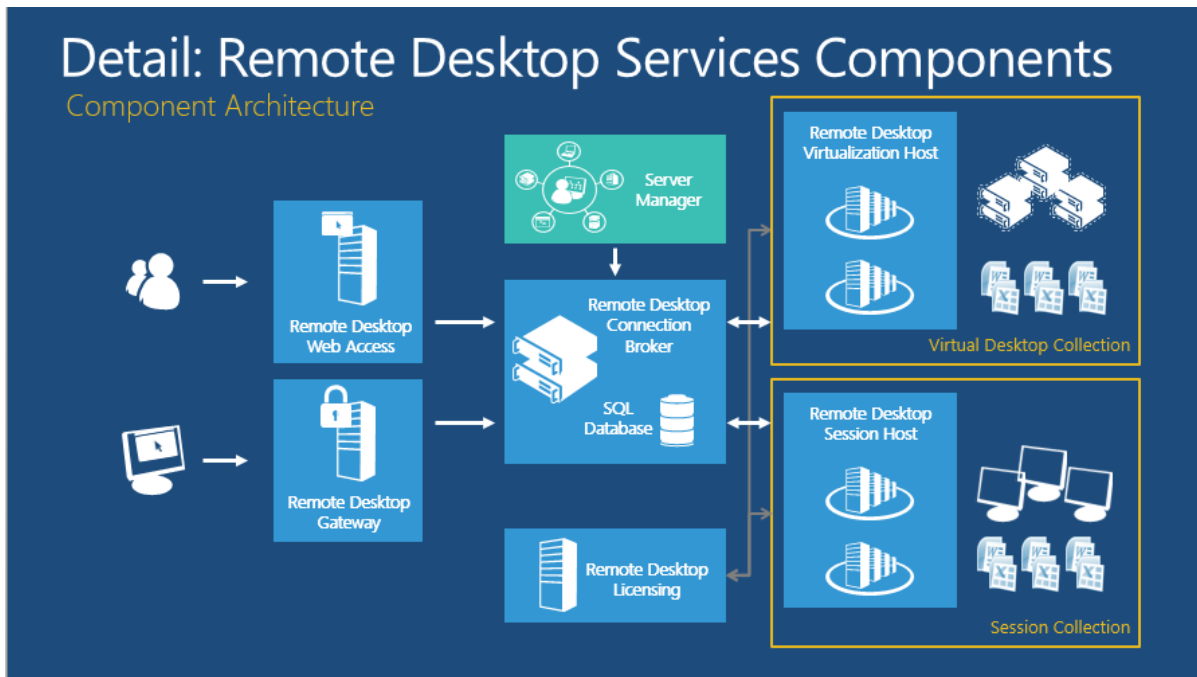


Figure 3 Remote Desktop Services Components

RDS over here is the common access method used to access the user’s requirements through the RDS Gateway, which in turn connects to the user’s allocated virtual host or services.

## 5. Storage Requirements

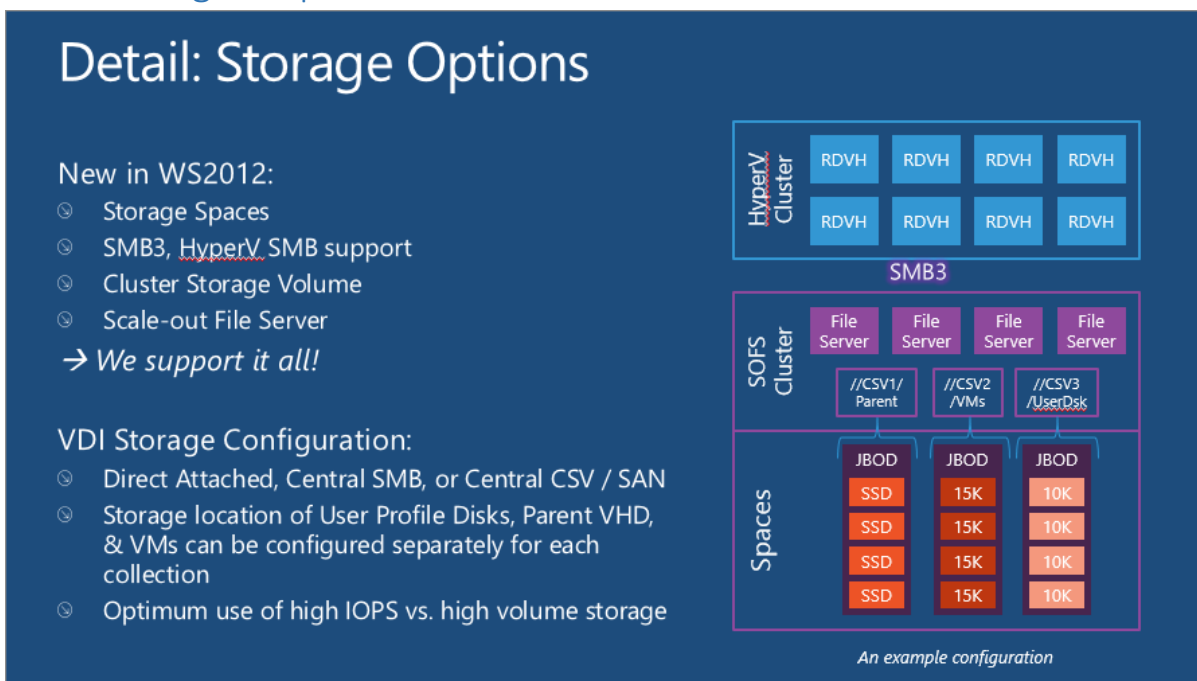


Figure 4 Storage Requirements

## Solution Document for VDI Project

Now in the storage part Windows Server can address DAS, Pooled SAN or centrally managed SMB v3 services. Scale-Out File Servers are ideal for server application storage. Some examples of server applications that store their data on a scale-out file share are listed below:

- The Internet Information Services (IIS) Web server stores configuration and data for Web sites. For more information, see [Shared Configuration](#).
- Hyper-V stores configuration and live virtual disks. For more information, see [Deploy Hyper-V over SMB](#).
- SQL Server stores live database files. For more information, see [Install SQL Server with SMB fileshare as a storage option](#).
- Virtual Machine Manager (VMM) stores library files and automatically performs some tasks, including setting permissions on file shares. For more information, see [How to Assign SMB 3.0 File Shares to Hyper-V Hosts and Clusters in VMM](#).

NOTE: Scale-Out File Server for Application Data Overview:

<http://technet.microsoft.com/en-us/library/hh831349.aspx>

## 6. High Availability

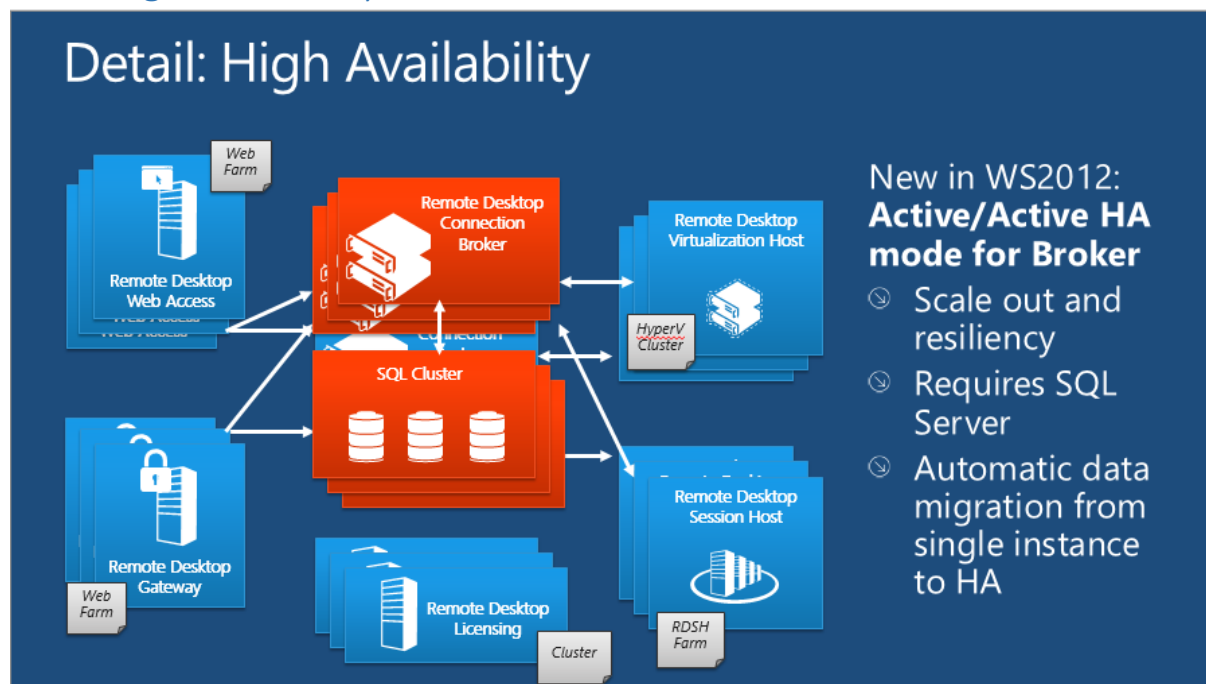


Figure 5 High Availabilities

The newest feature in the family of Windows Server 2012 and onwards, has the abilities to cater to automatic data migration from single instance, requires SQL Server and can scale out to a massive level with resiliency or its fault tolerant.



## 7. Professional Management

**Efficient management**  
Simple to deploy, intuitive to manage, easy to expand at scale

- Easy Deployment**
  - Set up a simple VDI deployment easily and quickly
  - Wizard-based setup and deployment for multiple scenarios
  - Automatic creation of VM with settings
- Unified Administration**
  - One, integrated console for roles, servers, collections, users, and VMs
  - Consistent publishing apps and desktops
  - Automate and manage at scale with Powershell
- Streamlined VM Management**
  - Master images for personal and pooled VMs
  - Avoid patch storms by queuing maintenance updates
  - Streamlined VM mgmt: Fast sysprep, optimized logon, auto rollback

Figure 6 Management Capabilities

Microsoft has released number of enhancements in the management capabilities of PowerShell which essentially manages VDI deployment and maintaining it.

Since in the real world VDI deployment, failure rates of VDI project is more than 80% on a larger scale. But yet Microsoft tend to survive the trend and update the necessary components and fine tuning it. But the success rate is also been seen in the field that joint commissioning of VDI projects with Citrix is also proven to have better chances of winning against competitors.

- Citrix Ready VDI Capacity Validation Program for Storage Partners (750 User Verified): <http://www.citrix.com/cms/ready/citrix-vdi-capacity-program/>
- Microsoft & Citrix Joint Solutions: <http://citrixandmicrosoft.com/Solutions/DesktopVirtualization.aspx>

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With the joint Citrix/Microsoft approach to VDI, businesses can leverage the enhanced VM density capabilities of Microsoft Hyper-V 2008 R2 SP1 to provide their users with the rich experience of Windows 7 using Remote FX while enabling IT to securely manage both their physical and virtual infrastructures using System Center. Through robust integration with Windows Server 2008 R2 and System Center management capabilities, and together with partner technology from Citrix, Microsoft Hyper-V 2008 R2 SP1 clearly delivers unique end-to-end business value for VDI that is second to none. Since Microsoft released the 2012 R2 edition of Windows Server, the capacity enhancement is like 16x on that of previous versions.

### 8. TEST Scenario

Below picture shows the setup used for determining maximum achievable VM density in a Microsoft Hyper-V 2008 R2 SP1 VDI environment. Initial testing was performed on an HP DL 380 G6 server with dual quad hyper-threaded (Nehalem) processors configured with 96 GB and connected via iSCSI to a 42 disk storage array configured as RAID 0 for maximum read/write throughput.

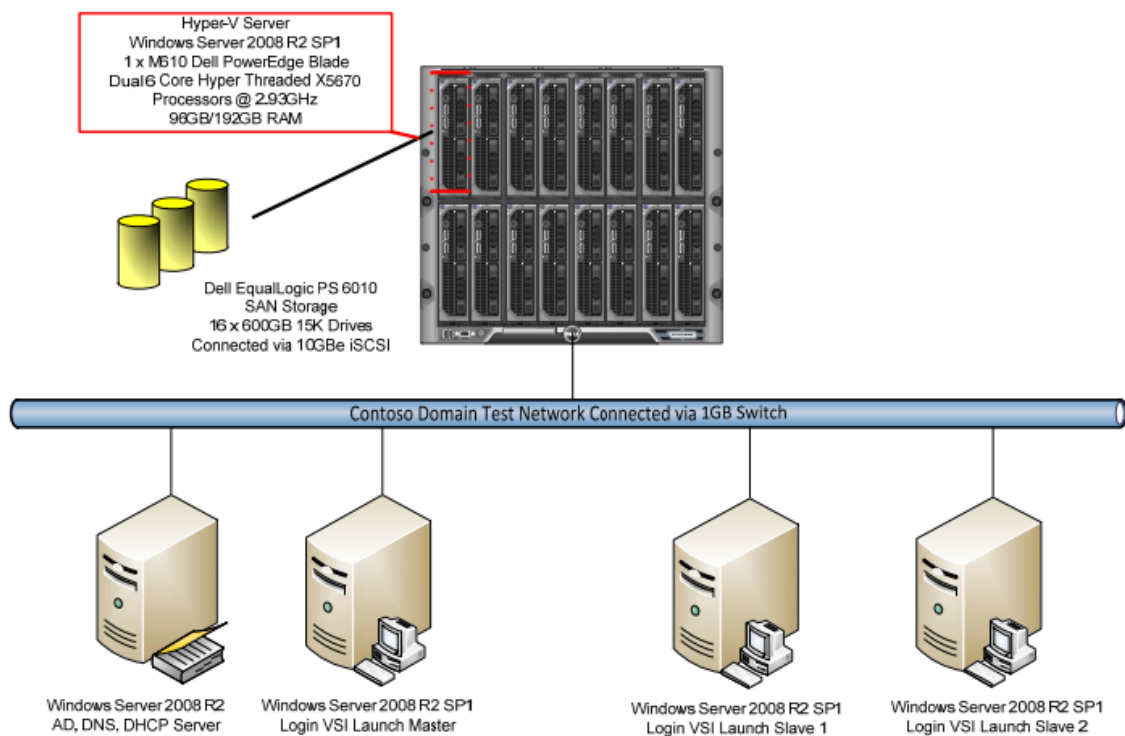


Figure 7 TEST Scenario with DELL Hardwares

Subsequent tests were performed using a single Dell M610 server blade connected via iSCSI to a Dell EqualLogic SAN where the virtual hard disks for the virtual machines are stored. Figure 1 shows the details of the VDI environment used for testing Microsoft Hyper-V 2008 R2 SP1 VM density using the latter hardware platform.

For an overview of Microsoft's end-to-end VDI offering, see:

<http://www.microsoft.com/windows/enterprise/solutions/virtualization/operating-system/>

### 8.1 Microsoft Benefits

- User disk enables personalization on pooled VM's or sessions.
- User data & settings are stored in a separate VHD.
- Fairshare ensures across all user VM's
- Dynamically distributes resources like bandwidth, I/O, CPU.
- DAS, NAS, clustered SAN storage availabilities.
- Tiered storage configurations.
- Active/Active Broker Services.

### 8.2 Test Results for Windows 7 SP1 64-bit Guests

While the VM running Windows 7 SP1 64-bit would start successfully on 512MB of RAM, when the tests executed it was determined that each, on average, utilize about 725MB of system memory running under full workload when Dynamic Memory is enabled per VM. To allow for proper functioning of the host therefore, the following calculation was used to determine the initial VM density goal for Windows

7 SP1 64-bit:

96GB (system memory) – 9GB (for headroom) = 87GB (available for VMs)

87GB /725MB = 120 VMs (estimated)

Below figure shows the Login VSI response results for a test of 120 Windows 7 SP1 64-bit guests. The graph shows the minimum, maximum and average response time as more and more "users" successively log onto their virtual desktops and perform their "work" (both user and work are simulated using the Login VSI tool). The blue line in the graph is an index generated by the tool that measures response time, which reflects the latency users experience when executing their workload. Response time is measured in milliseconds and ranges from zero to a maximum of nearly 2000 milliseconds. The maximum acceptable response time (VSI<sub>max</sub>) for these tests was defined as 2 seconds. If VSI<sub>max</sub> is reached more than six times during a test run, Login VSI considers the host to be saturated and the target VM density not to have been achieved.

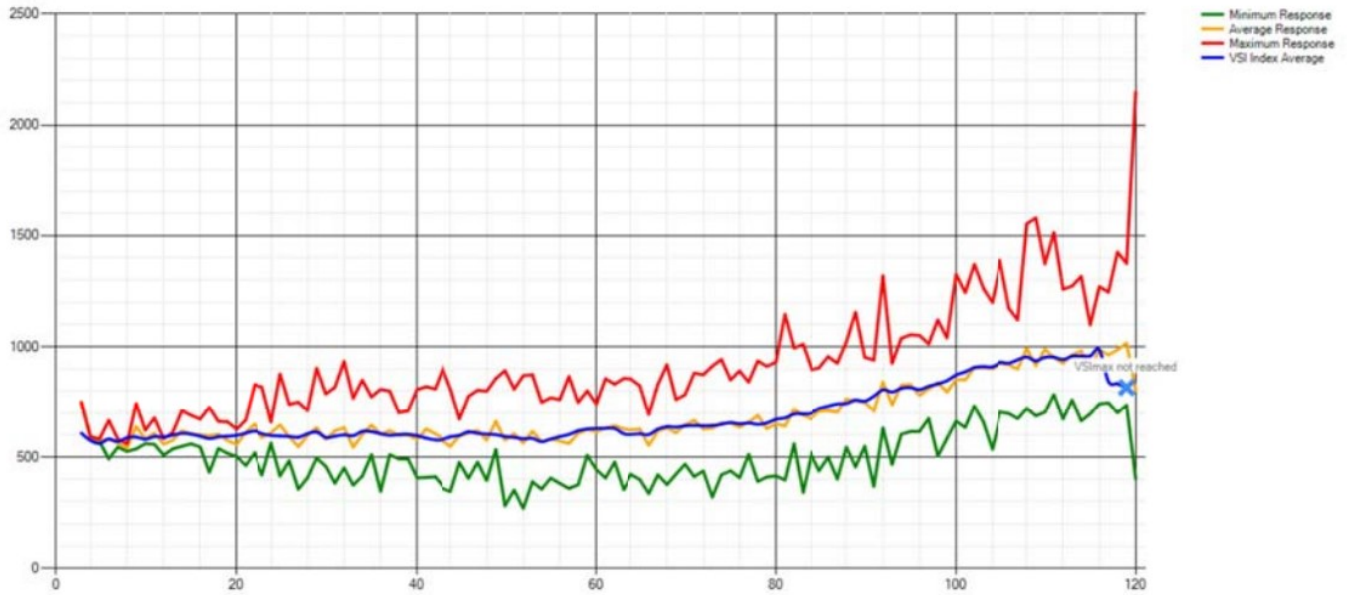


Figure 8 Windows 7 Test Results in VDI Environment

### 8.3 Test Results for Windows XP Guests

The environment for testing Windows XP guests was conducted on single Dell M610 Blade with 96GB RAM running Windows Server 2008 R2 SP1 with the Hyper-V role installed. Because older operating systems like Windows XP are not supported by Dynamic Memory, the testing for this scenario involved using 120 Windows XP SP2 32-bit guests each assigned 768MB of static RAM in Hyper-V Manager. All tests were considered a pass with workload level sessions and VSI Max was never achieved.

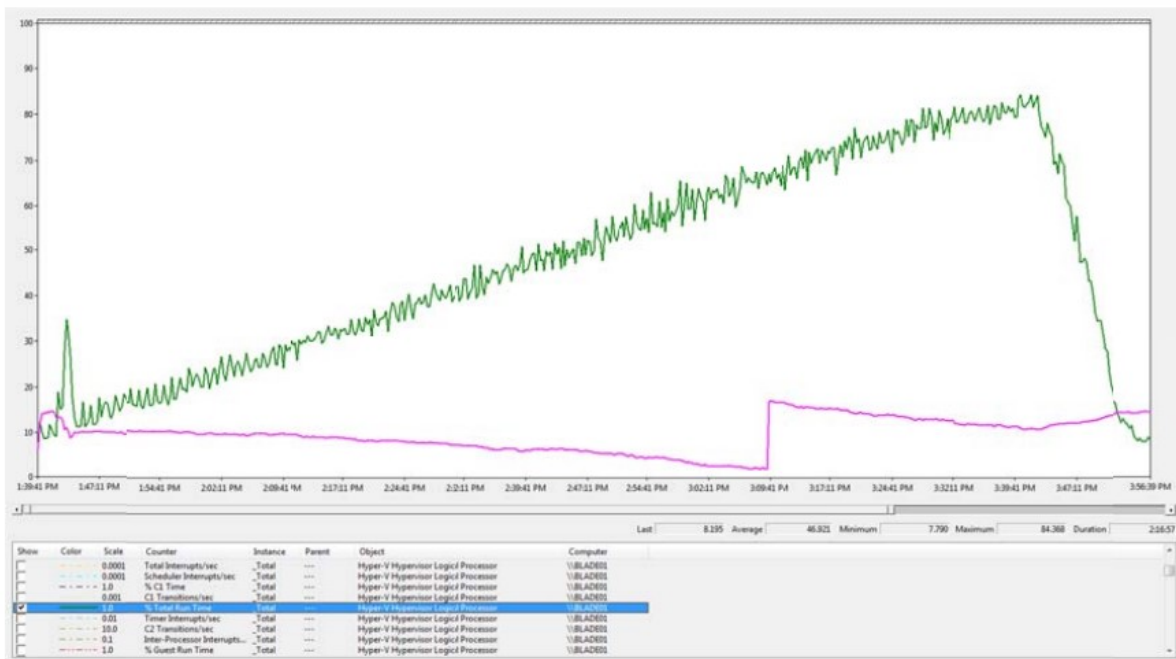


Figure 9 Windows 7 Test Results in VDI Environment

## Solution Document for VDI Project

Processor utilization (GREEN) & available system memory (PINK), with 120 Windows XP SP-2 x86 based guests results.

9. **Design Guideline:** Though the solution MS has is a bit bulky in terms of session broker capabilities, where the joint solution stack, we can really do wonder as the joint Solution of Citrix, provides much richer capabilities, and faster executions on their VDI in a box capabilities.

### Pooled or Personal?

VDI-in-a-Box provides personalized desktops where users can install their own applications and store their configuration and data. These personalized desktops are generated from a master image providing the best of both worlds: users get personalized desktops while windows desktop administrators manage a single master image. This saves time and money while delivering a highly personalized end-user experience.

Personalized Virtual Desktops offer another big benefit: single instance management. Rather than juggling many persistent desktops, IT can maintain one master copy of desktop images while preserving the personalization of user applications and data. This dramatically reduces recurring management overhead and cuts datacenter storage costs up to 90 percent.

**Solution Spec with Citrix SKU:** Contact your local Licensing Specialist for the Citrix/Microsoft Combined SKU.

### RAM Requirements:

- 0.5 - 1 GB for Windows XP
- 1.5 - 2 GB for Windows 7 desktops
- At least 1 GB for the hypervisor
- At least 1 GB for the VDI-in-a-Box appliance
- 10% reserved for server operations

### Hard Drives Requirements:

- Recommended: SAS 15K (preferred) or SATA/SAS SSD
- SAS 10K/15K (Nearly Costs the same)
- Desktop requirements (rough rule of thumb for steady state!)
- Windows XP desktops 5 to 10 IOPS
- Windows 7 desktops 10 to 20 IOPS
- Rough rule of thumb on the number of disks
- 4 disks for approximately 25 desktops
- 6 to 8 disks for approximately 50 desktops
- 10 to 12 disks for approximately 75 desktops
- IOPS Requirements

## Solution Document for VDI Project

RPM	IOPS (Raid 0)
SSD	6000
15K	175
10K	125
7200	75
5400	50

### SSD or NOT:

- SSD is roughly 30 times faster than conventional rotational mechanism
- SSD with SATA
- Many customers are using it with very positive results
- Eliminates disk I/O bottleneck completely
- Best when there are a few golden images (keep them small!)
- Price is coming down fast!

### How much storage is required?

- Capacity is determined by the # of images and the # of desktops
- Assumption: user and profile data stored externally
- Formula: Nothing called formula that can do the sizing accurately
- 2 X Golden Image X number of Golden Images
- 74 GB for VDI-in-a-Box appliance (can be reduced)
- 15% of size of image/desktop (savings due to linked clones)
- Example: Assume 2 golden images of 20 GB & 50 desktops
- Golden image:  $2 \times 20\text{GB} \times 2 = 80\text{GB}$
- VDI-in-a-Box appliance space = 74GB
- Image space/desktop  $15\% \times 20\text{GB} \times 50 = 150\text{GB}$
- Extra room for swap & transient activity = 100GB
- Total = 404GB

**Recommended:** 500GB to 1TB (Raid 0) per server so there is plenty of room for expansion. 2TB would be a great idea to house even more VDI's.

### Example

Server has two Intel Xeon L5640 2.28Ghz HT <b>CPU:</b> 6-core processor with hyper-threading that's 12 cores with 2 processors; Look at them as 24 cores <b>Memory:</b> 64GB RAM <b>Disk:</b> 1 TB with 8 spindles 15K SAS, Raid 0			
CPU	Memory	Disk	Storage
<ul style="list-style-type: none"> <li>• <math>6 \times 23 = 138</math> desktops (1 core for hypervisor)</li> </ul>	<ul style="list-style-type: none"> <li>• 2GB total required for VDI-in-a-Box &amp; the hypervisor</li> <li>• 90% of 64 GB = 57.6 GB</li> <li>• <math>57.6 - 2 \text{ GB} (1 \text{ for VDI-in-a-Box and } 1 \text{ for the hypervisor}) = 55.6 \text{ GB}</math></li> <li>• 55, 1GB XP Desktops OR 27, 2GB Win7 Desktops</li> </ul>	<ul style="list-style-type: none"> <li>• 175 IOPS for 15k SAS</li> <li>• 4 spindles = 700 IOPS</li> <li>• <b>70</b> XP Desktops assuming 10 IOPS per Desktop OR <b>35</b> Win7 Desktops assuming 20 IOPS per Desktop</li> </ul>	<ul style="list-style-type: none"> <li>• <math>2 \times 20 \text{ GB} \times 2 = 80 \text{ GB}</math> for images</li> <li>• 74 GB for VDI-in-a-Box</li> <li>• <math>15\% \times 20 \text{ GB} \times 55 = 165 \text{ GB}</math></li> <li>• 1 TB is sufficient</li> </ul>
Take the lowest of the number from CPU, Memory and Disk Thus, server configuration can support <b>55 XP Desktops</b> OR <b>27 Win7 Desktops</b> <i>conservatively</i>			

Figure 10 Hardware Considerations

## Focus Resolution

Combined Citrix & Microsoft VDI Solution Stack. As all Microsoft solution with the combined solution of Citrix VDI will have a better chance of winning against our competitor.

### 10. Bill of Material for 700 VDI users, Concurrent: 200 users Microsoft License Requirement

Microsoft License Requirement (Option I)		
Number of Windows 7 VDA licenses	150	Licenses
Windows Server 2012 Datacenter Edition licenses	5	Licenses
Microsoft SQL 2012 Standard	4	Core based Lic (2 pack)
Number of Windows TS/RDS Cal Licenses	550	Licenses

Microsoft License Requirement (Option II)		
Number of Windows 7 VDA licenses	300	Licenses
Windows Server 2012 Datacenter Edition licenses	5	Licenses
Microsoft SQL 2012 Standard	4	Core based Lic (2 pack)
Number of Windows TS/RDS Cal Licenses	400	Licenses

Microsoft License Requirement (Additional)		
System Center 2012 R2 Datacenter Edition	2	
System Center Client Management Suite	100	

## Solution FINAL Design

Engaged partner will design the final layout, sizing of the total solution for the total user base of 4,500.

**Citrix Part: VDI-in-a-Box, Unknown SKU, Consult Citrix or local partner of Citrix.**

## Recommended Hardware

- **General information:** RAM: 128GB, Advanced ECC with 1600Mhz RDIMMS, Processor: 2x Intel® Xeon® E7-4830 v2 Processor 2.2GHz, 20M Cache, 10 Core
- **HP:** <http://www8.hp.com/us/en/products/proliant-servers/product-detail.html?oid=6636692#!tab=specs>



- **DELL:**  
[http://configure.us.dell.com/dellstore/config.aspx?oc=bect91&model\\_id=poweredge-r920&c=us&l=en&s=bsd&cs=04](http://configure.us.dell.com/dellstore/config.aspx?oc=bect91&model_id=poweredge-r920&c=us&l=en&s=bsd&cs=04)

### Useful Links:

- a. VDI Home: <http://www.microsoft.com/en-us/windows/enterprise/products-and-technologies/virtualization/operating-system/default.aspx>
- b. Virtualization: The benefits of VDI: <http://technet.microsoft.com/en-us/magazine/dn170431.aspx>
- c. Microsoft Virtual Desktop Infrastructure (VDI) Explained : <http://technet.microsoft.com/en-us/video/microsoft-virtual-desktop-infrastructure-vdi-explained.aspx>
- d. [VIR311: Planning and Deploying Microsoft VDI with ...](#)
- e. [VDI from Microsoft and Citrix: What is it? How do I manage ...](#)
- f. VDI from Microsoft & Citrix: <http://channel9.msdn.com/Events/TechEd/Australia/2010/CLI304>
- g. Virtualization: VDI made easy: <http://technet.microsoft.com/en-us/magazine/jj992579.aspx>
- h. Everything you ever wanted to know about Microsoft VDI - from TechEd 2012: <http://blogs.msdn.com/b/rds/archive/2012/07/12/all-you-want-to-learn-about-microsoft-vdi-from-teched-2012.aspx>
- i. Deploying Microsoft VDI in Windows Server 2012 R2: <http://social.technet.microsoft.com/wiki/contents/articles/5467.deploying-microsoft-vdi-in-windows-server-2012-r2.aspx>
- j. [Demystifying Virtual Desktop Infrastructure \(VDI\) Licensing](#)
- k. [Licensing the Windows Desktop for VDI Environments](#)
- l. Deploying the RDS Quick Start deployment type in Windows Server 2012 (for Session Virtualization): <http://social.technet.microsoft.com/wiki/contents/articles/10421.deploying-the-rds-quick-start-deployment-type-in-windows-server-2012.aspx>
- m. Deploying the RDS Standard deployment type in Windows Server 2012 (for Session Virtualization): <http://social.technet.microsoft.com/wiki/contents/articles/12180.deploying-the-rds-standard-deployment-type-in-windows-server-2012-for-session-virtualization.aspx>
- n. RemoteApp for Hyper-V (VDI) Deployment: <http://blogs.msdn.com/b/rds/archive/2010/03/08/remoteapp-for-hyper-v-vdi-deployment.aspx>
- o. Manage VDI using SCCM 2012: <http://channel9.msdn.com/Shows/Edge/Edge-Show-5-Manage-VDI-using-SCCM-2012>
- p. Windows Server 2012 VDI/RDS Infrastructure and Management: <http://channel9.msdn.com/Events/TechEd/NorthAmerica/2012/VIR314>
- q. SEVEN Module Knowledgebase Session for Microsoft & Citrix VDI Solution: <http://channel9.msdn.com/Series/Using-Microsoft-VDI-to-Enable-New-Workstyles/Using-Microsoft-VDI-to-Enable-New-Workstyles-01-Introduction-to-Desktop-Virtualization>

## Solution Document for VDI Project

- r. Citrix VDI-in-a-Box ROI Calculator:  
[http://www.citrix.com/content/dam/citrix/en\\_us/documents/products-solutions/vdi-in-a-box-roi-calculator.xlt](http://www.citrix.com/content/dam/citrix/en_us/documents/products-solutions/vdi-in-a-box-roi-calculator.xlt)
- s. Citrix [VDI-in-a-Box Server Sizing Calculator](#)
- t. Deploy Scale-Out File Server: <http://technet.microsoft.com/en-us/library/hh831359.aspx>



- Blog Site: <http://mobs-bd.org>
- About Me: [http://mobs-bd.org/?page\\_id=109](http://mobs-bd.org/?page_id=109)
- Profile @ Microsoft:  
<https://www.mcpvirtualbusinesscard.com/VBCServer/shuvromcse/profile>
- YouTube Training Channel: <http://www.youtube.com/user/shuvromcse>



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