XenDesktop and XenMobile Reference Architecture

This document is intended for IT architects who want to deliver secure business mobility for their organizations. It describes how to use XenDesktop 7.1 together with XenMobile 8.6 to provide users with seamless access to hosted desktops and applications using any device.

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Today's technology has created a more mobile user who wants access to their data from anywhere, with their choice of device. Citrix® addresses this need with the concept of a mobile workspace, providing secure access to desktops, applications and data, anytime, anywhere. XenDesktop® with FlexCast® technology and Citrix Receiver™ provide a key component of the mobile workspace, allowing users to connect from any device. However smartphones and tablets bring another dimension to endpoint devices. Smartphone users want access to mail, web sites, and files, but access from untrusted devices can raise serious security and compliance concerns. XenMobile® reduces this risk with enterprise grade mobile device management, mobile application management and mobile productivity apps. XenMobile and XenDesktop together provide a truly comprehensive solution for business mobility. To achieve this, XenMobile is deployed to better empower smartphones and tablets, and is seen as yet another component in the FlexCast model.

When designing a virtual desktop solution, there are many considerations to bear in mind, ranging from the type of desktops required, to how users will access the data, and how you build an environment that can grow. For example, does the user require a dedicated persistent desktop, or is a hosted shared desktop the best solution? Successful deployment of virtual desktops relies on users having a positive experience: this means getting the correct type of desktop to each user. With Citrix® FlexCast®, multiple desktop types and access methods are supported.

The objective of this document is to describe how to build a modular environment to deliver desktops and applications to local, remote, and mobile users, supporting both XenDesktop® and XenMobile®. The design of this environment focused not on maximizing the number of users or on maximizing performance, but rather on assessing the number of users that could be supported on a pre-defined set of hardware while still maintaining a positive user experience and providing mobile support to XenMobile users.

Summary

The goal was to:

- Create an environment to support remote and local XenDesktop and XenMobile users
- Design a modular solution that allows for growth
- Follow or highlight Citrix best practices and recommendations where possible

HP ProLiant BL460c Gen8 blades and an EMC VNX 8000 were used to build the first module. Microsoft Windows Server 2012 R2 with the Hyper-V role was used as the base hypervisor. The number of supported users was determined by the mix of HSD (hosted shared desktops) and HVD (hosted virtual desktops – VDI): a mix of 80/20 HSD/HVD was used. A cluster of two servers was created in the first module to support the XenDesktop infrastructure VMs (XD Broker, SQL, license server, Provisioning Services, etc.). The infrastructure configuration will support two or three additional modules. However, additional SCVMM and Provisioning Services VMs may be required depending on the HSD/HVD ratio.

XenMobile was configured to support 1000 mobility devices, that is, about 50% of the XenDesktop users in the first module. A third single server was added to support the XenMobile infrastructure (Mobile Device Manager, AppController).

To handle installation and initial configuration two servers were configured to run the root Active Directory, SCVMM, and Windows Deployment Services. These were outside the modules.

Our design proved capable of supporting a mix of just over 2000 HSD and HVD users in a single module along with 1000 XenMobile users. The number of XenApp/XenDesktop users is flexible depending on user workload and the distribution of HSD compared to HVD users.

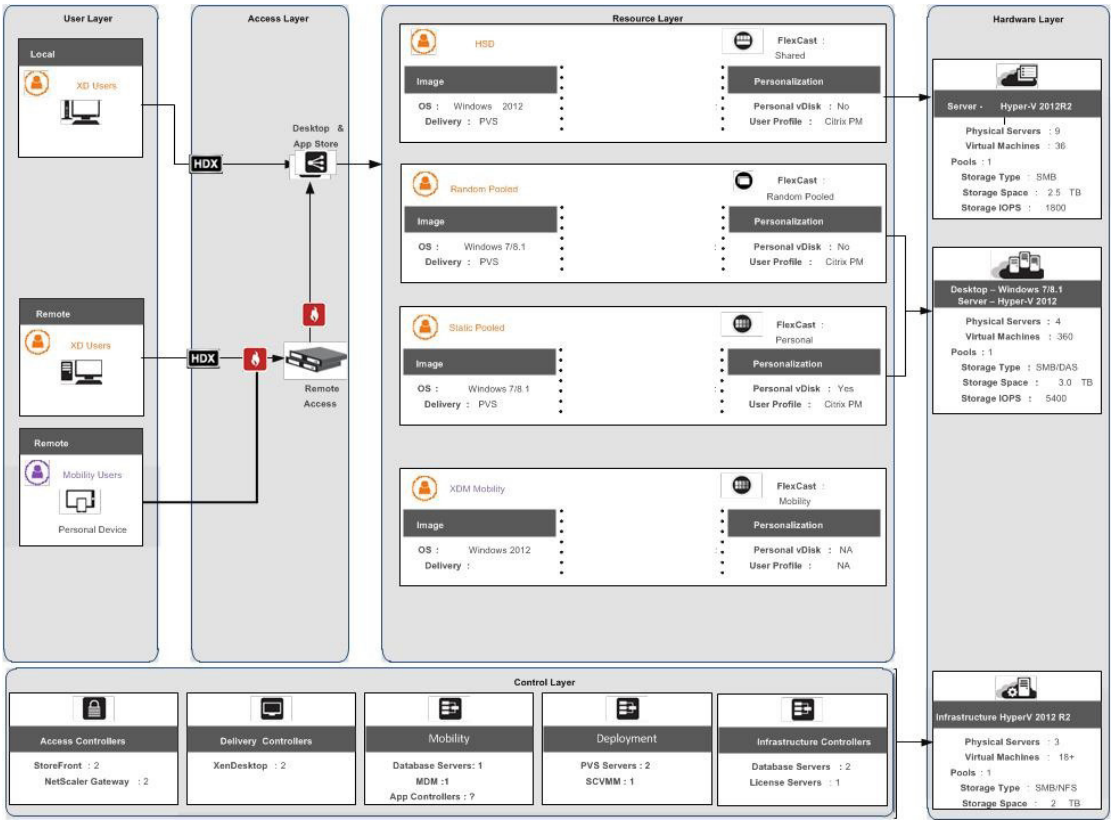
Architectural design framework

The architectural goal was to create a modular design that could grow easily while supporting both local and remote XenDesktop users as well as XenMobile users, using the Citrix 5-layer blueprint[1]. The blueprint breaks down the architecture into:

- User layer
- Access layer
- Resource layer
- Control layer
- Hardware layer

[1] http://support.citrix.com/servlet/KbServlet/download/35715-102-706600/XD7%252520-%252520Blueprint_v4.pdf

The design was as follows:



User layer

The user layer defines the different user groups and how they access their desktops. In this design the users were:

- Remote (20%) or local (80%) users
- Assigned a hosted shared desktop (80%), a random pooled desktop (10%) or a static pooled desktop with a personal vDisk (10%).

Every user in a company has the potential to be a mobile user at any point in time; however, we specified a number of 1000 steady-state mobility users. The infrastructure requirements for XenMobile Device Manager/AppController do not increase significantly between 1000 and 8000 users.

Access layer

The access layer defines how a user accesses the resources. In this architecture two NetScaler® 10500 systems in an active/passive configuration managed access for all remote users, directing them either to redundant StoreFront VMs to access a desktop, or to the XenMobile environment if they were mobile users. Internal users had direct access to the StoreFront VMs.

Resource layer

The resource layer defines the virtual desktops, applications, or XenMobile environment for the users. Desktops in this design consisted of:

- Hosted shared desktops (HSD)
- Random pooled desktops
- Static pooled desktops with a personal vDisk

Control layer

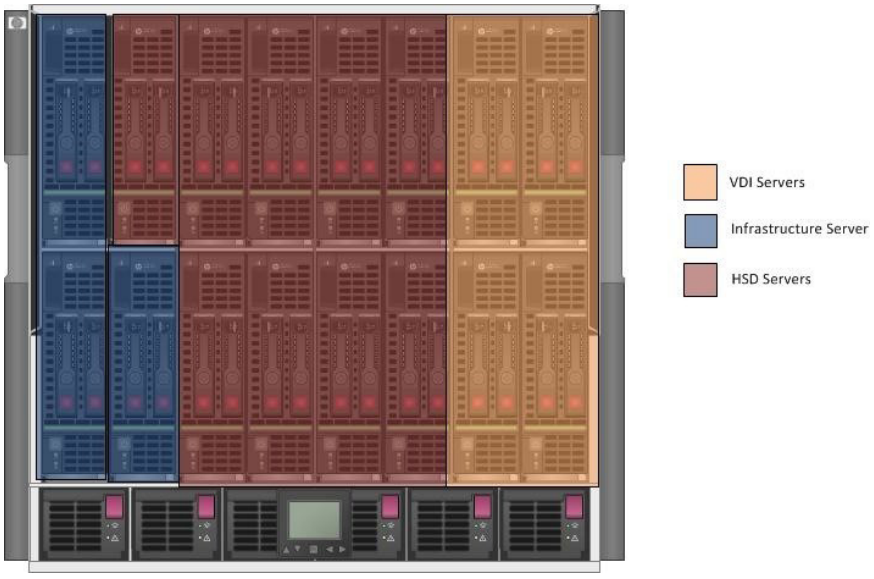
The control layer defines the infrastructure VMs required to support the users in accessing their resources. For XenDesktop, redundant VMs were created for StoreFront, the XenDesktop Broker, Provisioning Services, and SQL databases. For XenMobile a database server, a Mobile Device Manager (MDM), and redundant App Controllers were configured.

Hardware layer

The hardware layer defines the physical implementation required to support the solution. In the hardware layer in this design, three clusters of servers were created:

- HSD cluster
- VDI cluster
- Infrastructure cluster

Hardware



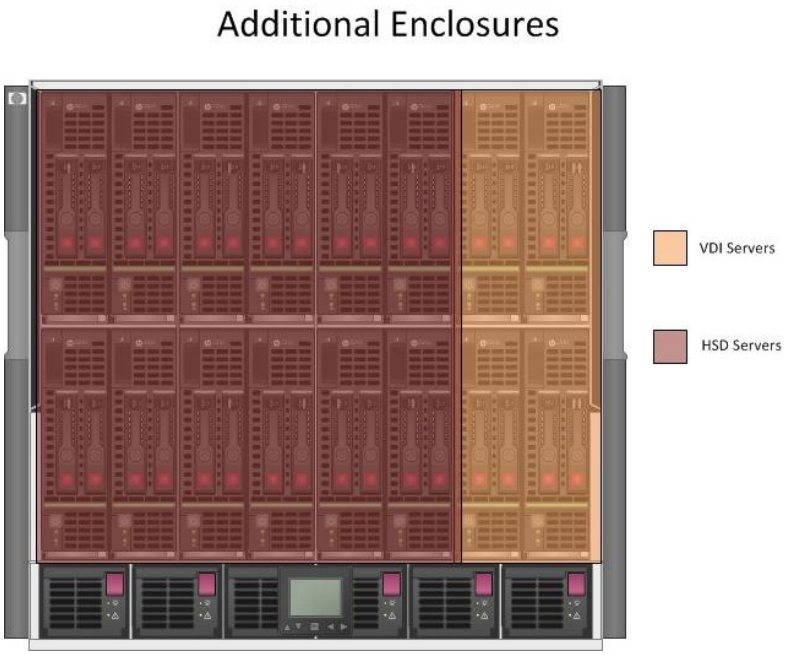
In the diagram above hardware is shown only as servers; however, hardware also includes networking and storage.

Servers

In the hardware layer, each server blade was configured as follows:

Three blades were configured in a cluster to support the control layer VMs. This configuration allows a physical server to fail without affecting the user experience. To support the HSD, nine physical servers were configured in a cluster, and two two-server clusters were created to support the VDI servers.

A second enclosure of servers can be added, leveraging the infrastructure VMs in the first enclosure, as shown below:



In this scenario 12 blades are dedicated to HSDs, two blades to random pooled, and two blades to static pooled with personal vDisk. The total number of users supported depends on how many HSD as opposed to VDI servers are configured. It may be necessary to run some additional Provisioning Services or SCVMM servers on the second enclosure for better performance. To prevent underutilization of a physical server, the additional infrastructure servers were run on the HSD cluster of physical servers, reducing the number of HSD VMs by one for each infrastructure VM. These additional infrastructure VMs were part of the sites defined in the primary enclosure.

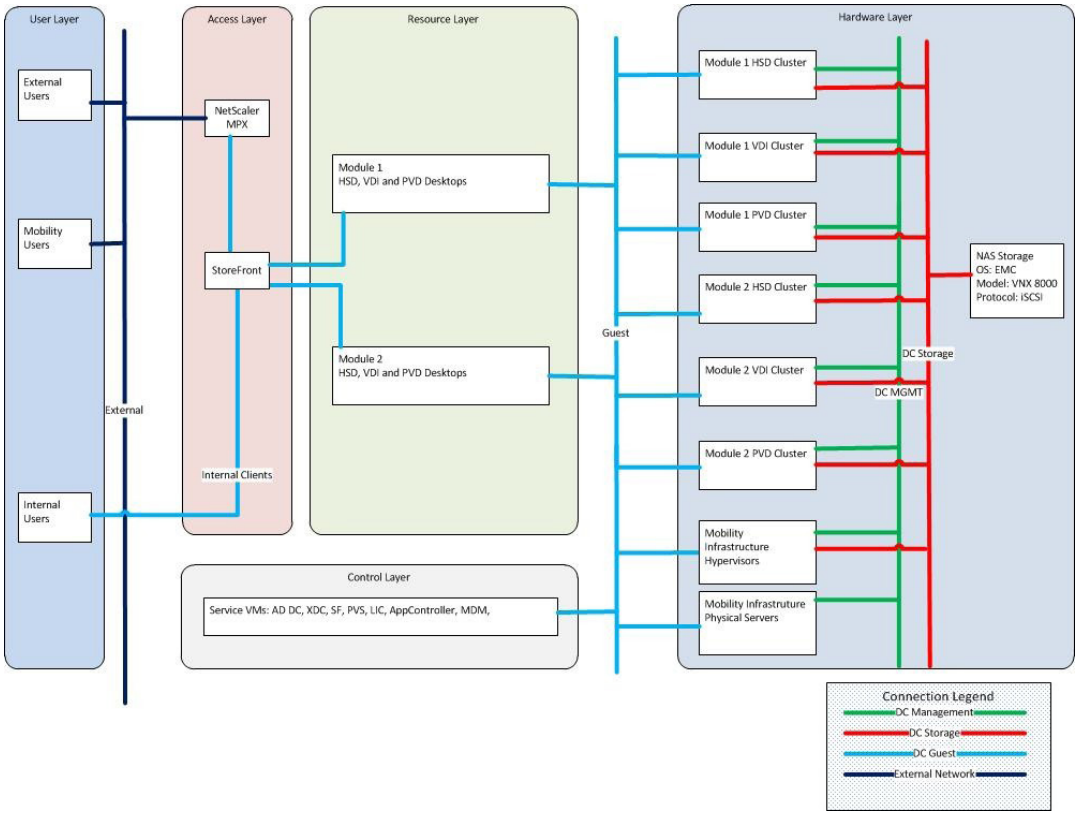
In this architecture, all blades were HP BL460c Gen8 blades with:

- CPU: 2 x Intel(R) Xeon(R) CPU E5-2670 @ 2.60GHz (8 Cores), HyperThreading enabled and the Power/Performance profile set to high
- Memory: 192 GB
- Disk: two 300 GB HDD, Raid 1, to hold the Windows Server 2012 R2 operating system

Networking

Networking was based on using four VLANs at the physical level, and creating a single VM network within Hyper-V to connect the VMs to the correct VLANs.

The four VLANs fit into the different layers as follows:



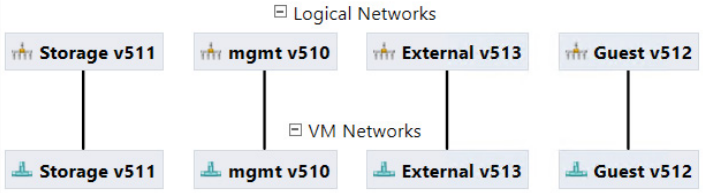
At the physical layer four networks were created:

- DC Management – 3 GBps, for handling infrastructure network traffic
- DC Storage – 5 GBps, for storage to server networking
- DC Guest – 7 GBps, for internal user network traffic
- External – 5 GBps, for connecting to the Internet from NetScalers

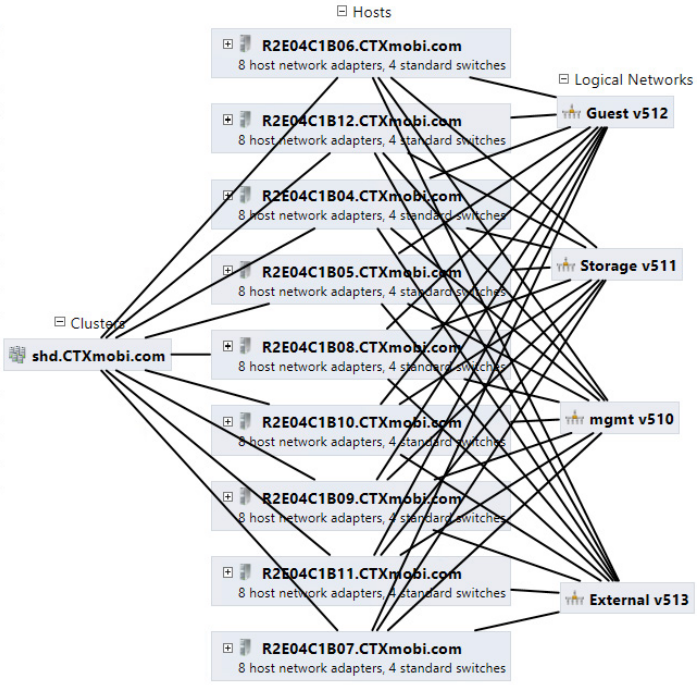
HP's Virtual Connect technology was used to set the network speeds. Within the Hyper-V 2012 R2 environment a VM network was created using SCVMM. Each of the VLANs was defined as a standard switch within Hyper-V. The network adapters in each VM were then connected to the correct standard switch/VLAN using the VM network.

The following diagrams show the Hyper-V network layout:

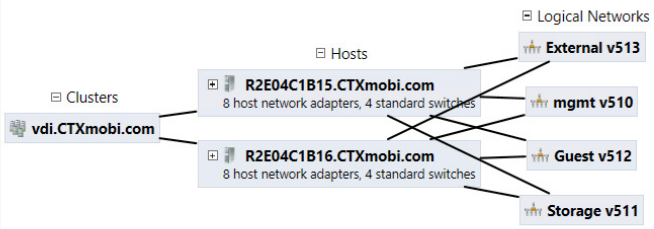
Name	Type
Type: VM Network	
Storage v511	VM Network
mgmt v510	VM Network
External v513	VM Network
Guest v512	VM Network
Type: Logical Network	
Storage v511	Logical Network
mgmt v510	Logical Network
External v513	Logical Network
Guest v512	Logical Network



Name	Type
Type: Host Cluster	
shd.CTXmobi.com	Host Cluster
Type: Host	
R2E04C1B07.CTXmo...	Host
R2E04C1B11.CTXmo...	Host
R2E04C1B09.CTXmo...	Host
R2E04C1B10.CTXmo...	Host
R2E04C1B08.CTXmo...	Host
R2E04C1B05.CTXmo...	Host
R2E04C1B04.CTXmo...	Host
R2E04C1B12.CTXmo...	Host
R2E04C1B06.CTXmo...	Host
Type: Logical Network	
Guest v512	Logical Network
External v513	Logical Network
mgmt v510	Logical Network
Storage v511	Logical Network



Name	Type
Type: Logical Network	
External v513	Logical Network
Guest v512	Logical Network
mgmt v510	Logical Network
Storage v511	Logical Network
Type: Host	
R2E04C1B15.CTXmo...	Host
R2E04C1B16.CTXmo...	Host
Type: Host Cluster	
vdi.CTXmobi.com	Host Cluster



Storage

For storage, an existing EMC VNX8000 with 15 shelves of 600 GB 15K drives, two storage processors, and eight data movers were used to support the virtual desktop environment. This storage is more than sufficient to support the storage requirements for this design and could be used to expand user capacity going forward. The iSCSI connections for the virtual desktop environment were served by the two storage processors.

The following tables define the LUNs created:

Module 1 LUNS

Type	Size GB	Purpose
iSCSI	1800	M1 WS2012 HSD
iSCSI	2	Witness LUN M1 HSD
iSCSI	1350	M1 Win81 VDI
iSCSI	2	Witness LUN M1VDI
iSCSI	2475	M1 WIN81 VDI + Personal vDisk
iSCSI	2	Witness LUN M1 VDI + Personal vDisk
iSCSI	625	SCVMM Library
iSCSI	3045	Hyper-V Common Infra
iSCSI	2	Witness LUN M1INFRA
iSCSI	2200	M2 WS2012 HSD
iSCSI	2	Witness LUN M2PVD
iSCSI	2025	M2 Win8 VDI
iSCSI	2	Witness LUN M2PVD
iSCSI	2475	M2 Win8 VDI + Personal vDisk
iSCSI	2	Witness LUN M2PVD
iSCSI	625	Provisioning Services 3 vDisk Storage
iSCSI	663	M2 User Profile

Software

Citrix XenDesktop overview

XenDesktop 7 is a reimagining of application and desktop virtualization for the mobile and cloud era that transforms apps and desktops delivery. XenDesktop 7 allows customers to select, configure, and scale more mobile use cases more quickly, easily and economically than ever before.

With XenDesktop 7.1 and the FlexCast Management Architecture, from a single site and a single console, customers can support three generations of Windows Server, from Windows Server 2008 R2 to Windows Server 2012 R2 as well as 16 bit, 32, or 64 bit apps through a combination of Windows 7, Windows 8, or Windows 8.1.

One of the major changes at XenDesktop 7 is the concept of a unified architecture and management for XenApp® and XenDesktop. Unlike previous deployments requiring separate infrastructure for XenApp and XenDesktop, the unification of the architecture enables administrators to design and deploy a single delivery infrastructure for delivering applications (formerly XenApp) and desktops (formerly XenDesktop).

Citrix XenMobile overview

Deployed alongside XenDesktop or XenApp, XenMobile enhances mobile security by ensuring that all devices—corporate-owned or BYOD—are compliant before they access the enterprise network. With XenMobile, IT administrators gain a centralized tool for managing and controlling BYOD devices used to access corporate resources, including all the desktops and apps delivered through XenApp and XenDesktop. Simply put, XenApp and XenDesktop centralize management of virtual apps and desktops, and XenMobile centralizes the management of BYO and corporate-issued mobile devices. The mobile device management (MDM) solution lets you:

- Enforce password protection for the device's lock screen
- Restrict corporate network access from jailbroken devices and blacklisted applications
- Enable encryption for select applications and data at rest and in motion—an especially important capability if your XenApp and XenDesktop policies enable drive mapping

Software components

The following table defines the software versions deployed:

Component	Version
Virtual desktop broker	Citrix XenDesktop 7.1
VDI desktop provisioning	Citrix Provisioning Services™ 7.1
Endpoint client	Citrix Receiver™ for Windows 4.1
User profile management	Citrix Profile management 5.x (included in XenDesktop)
VDI personalization	Citrix Personal vDisk 7.1
Web portal	Citrix StoreFront 2.1
Licensing	Citrix License Server 11.11.1
Workload generator	Login VSI 4.0.x (4.09)
Office software	Microsoft Office 2013
Virtual desktop OS (VDI desktops)	Microsoft Windows 8.1 x64
Virtual desktop OS (hosted shared desktops)	Microsoft Windows Server 2012 R2
Database server for SCVMM, XenDesktop Controllers, Provisioning Services	Microsoft SQL Server 2012 R2
Database server for XenMobile Device Manager	Microsoft SQL Server 2008 R2
VDI hypervisor management	Microsoft SCVMM 2012 R2
VDI hypervisor	Microsoft Windows Server 2012 R2 with Hyper-V & Failover Clustering Roles

Component	Version
NetScaler software	Citrix NetScaler 10.1.120.1316.e
Mobile device management	Citrix XenMobile Device Manager 8.6
XenMobile App Controller	Citrix App Controller 2.9
NetScaler Insight Center™	Citrix NetScaler VPX™ 10.1.120.13 for XenServer®

Implementing the design

Installation considerations and concerns

As stated previously, the aim of the design was to use existing servers and storage and size the environment to the hardware available. The number of VDI users per physical server was limited by the amount of memory in each physical server. The random pooled and static pooled VMs had 2 GB per VM and the physical servers had 192 GB. The number of users per physical host was set to 90 to ensure that the total assigned memory was less than the total available memory; the aim of this was to provide the best user experience and to use the dynamic memory capabilities of Hyper-V for any sudden changes or increased requirements in the environment.

Configuring NetScaler

The environment used two NetScaler MPX™-10500 appliances with:

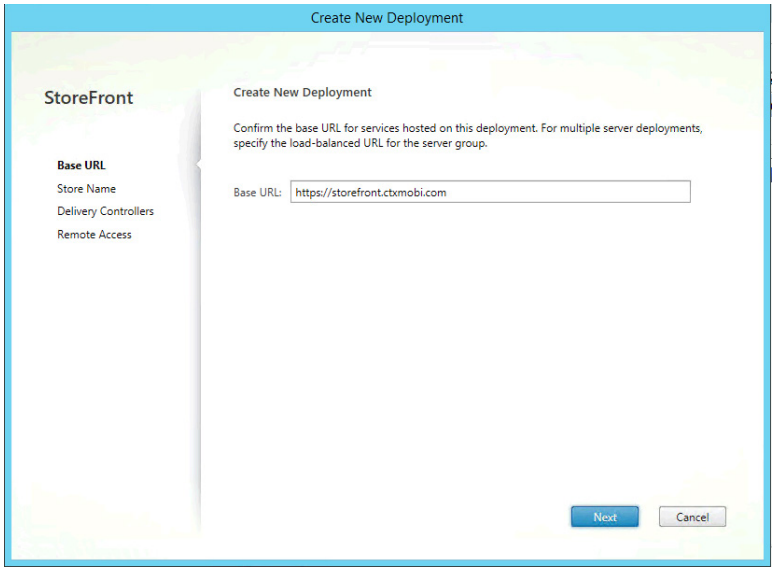
- 8 CPUs
- 2 1GB ports for management
- 16 1GB ports for data

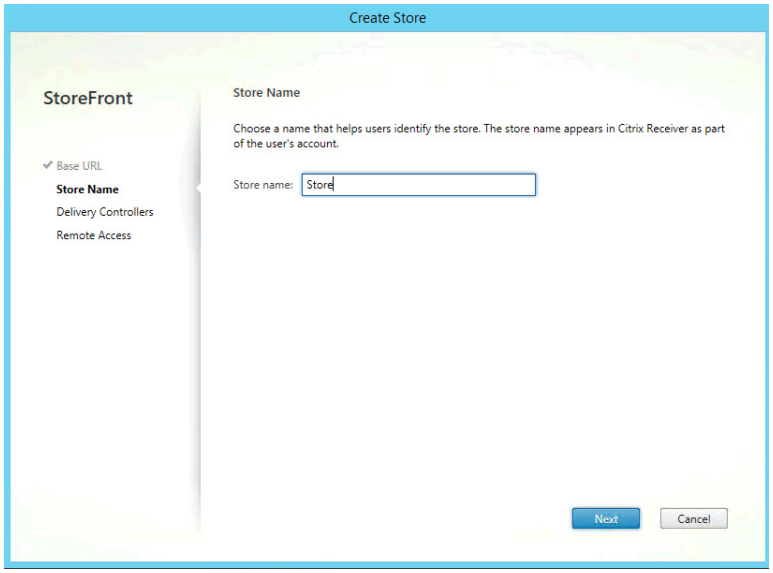
The NetScalers were configured with three Virtual IPs (VIPs): one for the XenDesktop users and two for the XenMobile users. Appendix A shows some of the screen shots from configuring the NetScalers. Some configuration settings worth noting:

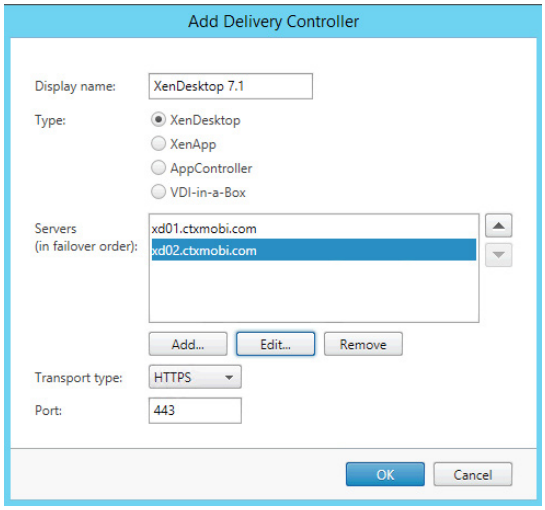
- Use the X-Forwarded-For client header as specified in http://support.citrix.com/article/CTX133185
- In the LB Services group for StoreFront, modify the persistence method: change it from COOKIEINSERT to SOURCEIP.
- Add a hosts file entry on the StoreFront servers to resolve the URL to its own local IP address.
- For the NetScaler gateway™, the callback URL should be the same as the external access URL: for further details, see http://support.citrix.com/article/CTX137385
- On the NetScalers, go under SSL and make sure that the certificate you are using for the AGEE is linked correctly to the intermediate, and that the intermediate is correctly linked to the root certificate.

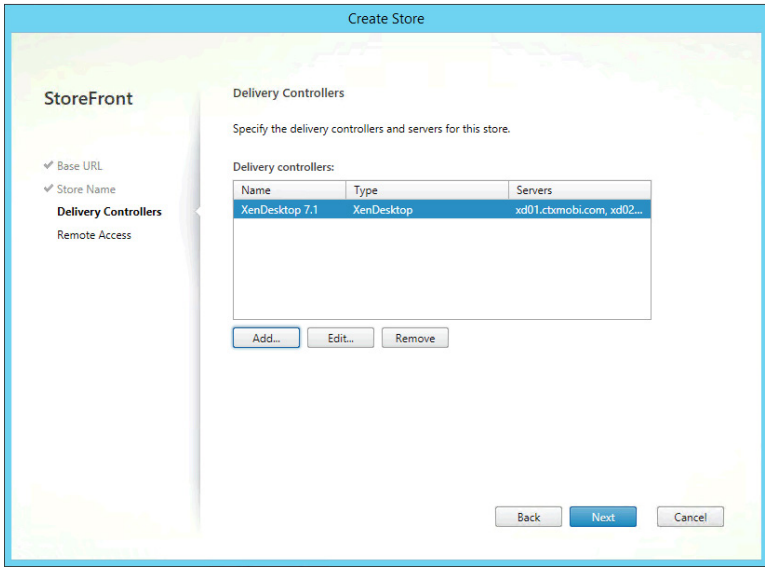
StoreFront considerations

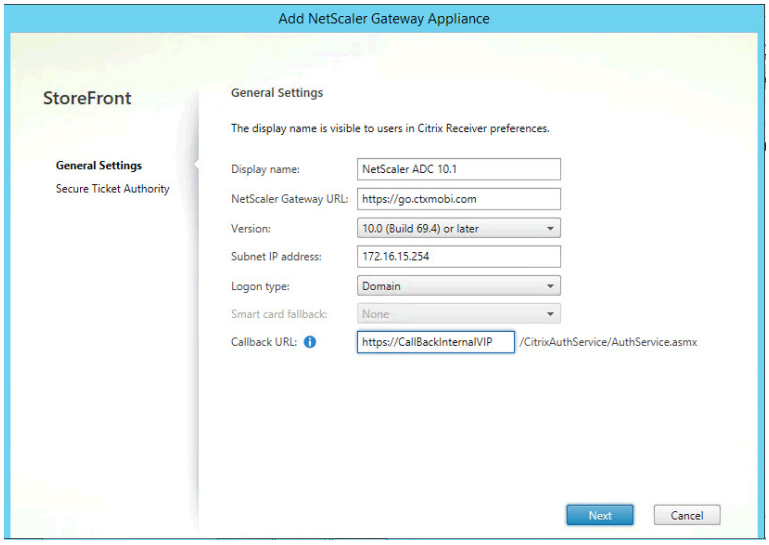
Load-balanced StoreFront VMs were configured to provide support for up to two modules and to allow for the potential failure of one of the StoreFront VMs. A basic installation was performed with the StoreFront software, and then a certificate was created to manage authentication and access. The following screens show the configuration:

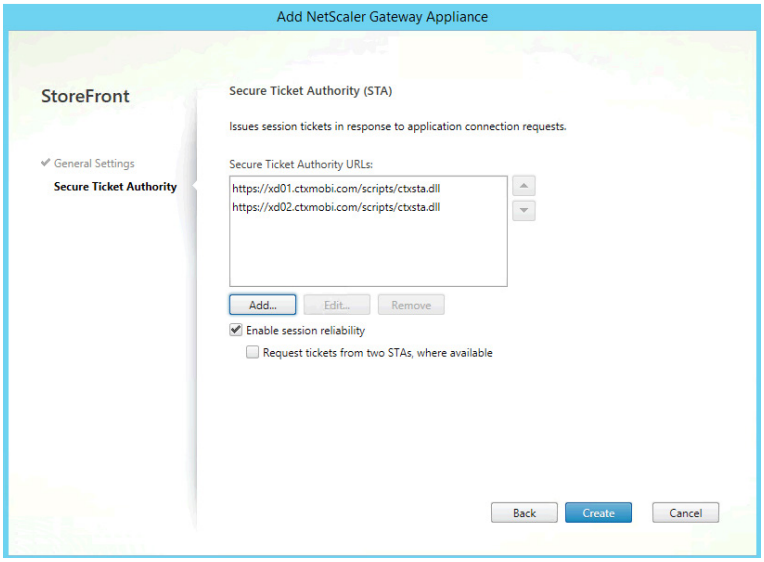

Create New Deployment
StoreFront
Create New Deployment
Confirm the base URL for services hosted on this deployment. For multiple server deployments, specify the load-balanced URL for the server group.
Base URL
Store Name
Delivery Controllers
Remote Access
Base URL: https://storefront.ctxmobi.com
Next
Cancel


Create Store
StoreFront
Store Name
Choose a name that helps users identify the store. The store name appears in Citrix Receiver as part of the user's account.
Base URL
Store Name
Delivery Controllers
Remote Access
Store name: Store
Next
Cancel


Add Delivery Controller
Display name: XenDesktop 7.1
Type:
XenDesktop
XenApp
AppController
VDI-in-a-Box
Servers (in failover order):
xd01.ctxmobi.com
xd02.ctxmobi.com
Add...
Edit...
Remove
Transport type: HTTPS
Port: 443
OK
Cancel


Create Store
StoreFront
Delivery Controllers
Specify the delivery controllers and servers for this store.
Base URL
Store Name
Delivery Controllers
Remote Access
Delivery controllers:
Name
Type
Servers
XenDesktop 7.1
XenDesktop
xd01.ctxmobi.com, xd02...
Add...
Edit...
Remove
Back
Next
Cancel


Add NetScaler Gateway Appliance
StoreFront
General Settings
The display name is visible to users in Citrix Receiver preferences.
General Settings
Secure Ticket Authority
Display name:
NetScaler ADC 10.1
NetScaler Gateway URL:
https://go.ctxmobi.com
Version:
10.0 (Build 69.4) or later
Subnet IP address:
172.16.15.254
Logon type:
Domain
Smart card fallback:
None
Callback URL:
https://CallBackInternalVIP
/CitrixAuthService/AuthService.asmx
Next
Cancel


Add NetScaler Gateway Appliance
StoreFront
Secure Ticket Authority (STA)
Issues session tickets in response to application connection requests.
General Settings
Secure Ticket Authority
Secure Ticket Authority URLs:
https://xd01.ctxmobi.com/scripts/ctxsta.dll
https://xd02.ctxmobi.com/scripts/ctxsta.dll
Add...
Edit...
Remove
Enable session reliability
Request tickets from two STAs, where available
Back
Create
Cancel

Once the store was deployed, authentication was configured with user name and password and the site domain as the only trusted domain. The StoreFront VMs were joined to a server group, and the NetScaler Gateway appliance was selected with no VPN tunnel.

VDI infrastructure VMs

For the infrastructure VMs a Cluster Shared Volume was created between the physical servers to hold the VMs and create a high availability (HA) environment.

Infrastructure VMs

VM	No.of VMs	OS	VHD GB	vCPU	Memory GB	Notes
XD Controller VMs	2	2012 R2	40	4	8	XenDesktop brokers
StoreFront	2	2012 R2	40	4	8	
Provisioning Services	2	2012 R2	40	4	16	
License server	2	2012 R2	40	2	4	Two license servers: one for Citrix and one for Microsoft
App Controllers	2	2012 R2	40	2	4	
AD/DNS/DHCP		2012 R2				Implemented as physical server to support WDS
Mobile device management	1	2012 R2	40	2	8	Configured for lab environment, need to work with consulting to size correctly
SQL	2	2012 R2	120	4	12	AlwaysOn configuration was used for XenApp and XenDesktop
HDX Insight™	1		240	2	4	VM on XenServer 6.2 server

The VHD for each VM was created as a dynamic VHD. Two physical hosts were configured with Windows Deployment Services, SCVMM, and SQL AlwaysOn as well as the root Active Directory. This was done to allow the use of Windows Deployment Services and SCVMM for bare-metal deployment of the physical servers. This SCVMM installation was used to manage the entire environment.

Two servers were configured to carry out deployment of the other physical servers. The first server was configured as a root AD/DC server with a single forest/domain and ran DHCP, DNS, NTP, and Certification Authority. The second server was configured with Windows Deployment Services and SCVMM to manage the infrastructure Hyper-V cluster and perform the bare-metal server deployment.

Profile management

Profile management 5.0 was used to manage user profiles. It was configured with a separate share to store the profiles, and also configured to leverage Group Policy Management to manage the profiles.

When using personal vDisk, by default the user profile is stored in the personal vDisk file. When using Profile management, in order to save space you should prevent the user profile from being directed into the personal vDisk file by editing the registry as follows:

- KEY: "HKLM\Software\Citrix\personal vDisk\Configuration"
- VALUE: "EnableUserProfileRedirection"
  - 0 = profile is not directed to the personal vDisk
  - 1 = profile is redirected to the personal vDisk (this is the default)

Caution! Using Registry Editor incorrectly can cause serious problems that might require you to reinstall your operating system. Citrix cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. Use Registry Editor at your own risk. Be sure to back up the registry before you edit it.

For more details see http://support.citrix.com/article/CTX131553.

Provisioning Services

Provisioning Services 7.1 was used to deploy the VMs. DHCP was configured to run on another domain controller, and PXE was configured to run on the Provisioning Services servers. Please note the following when using Provisioning Services 7.1:

- Best practice is to apply the latest hot fixes from Citrix.
- You must attach a network adapter to a logical network in the template, otherwise VM creation will fail.

Hosted shared desktops

The HSD VMs were configured as follows:

- 4 vCPU
- 12 GB RAM
- 80 GB VHD
- 25 GB Write Cache File with 24 GB fixed Page File, stored on SAN cluster

Each physical server supported 4 HSD VMs, giving a total of 36 HSD VMs across the nine physical servers in module 1. In our environment each HSD supported 50 users, so 200 users per server were supported with a total of 1800 users for module 1 in our design[2]. The loss of a physical server would mean the loss of four VMs and 200 users. This means that each remaining VM would need to support approximately 6-7 additional users and still remain within the acceptable performance levels.

Each HSD VM was installed with Windows Server 2012 R2. The HSD VMs were configured in a cluster to allow server migration if a physical server needed to be brought down for maintenance. For HA, the overall site was configured so that each HSD VM worked at about 80-90% capacity and if a physical server failed it was not necessary to restart the HSD VMs on different servers immediately because the users would be absorbed by the other VMs in the site. We determined the HSD VM performance using the Mobilizing Windows Apps FlexCast Services Design Guide[3] .

[2]For more information about XenApp scalabilty see http://blogs.citrix.com/2013/10/15/xenapp-scalability-v2013-part1/
[3]http://www.citrix.com/content/dam/citrix/en_us/documents/oth/mobilizing-windows-apps-design-guide.pdf?accessmode=direct

VDI – random and static pooled

Both random and static pooled VMs were configured as follows:

- 2 vCPU
- 2 GB RAM
- 40 GB VHD
- 4 GB Write Cache file with fixed 3GB Page file, stored on SAN cluster
- For static pooled VMs using personal vDisk, the vDisk was 10 GB in size

Two clusters were created: one for random pooled and one for static pooled with personal vDisk.

The physical servers had 192 GB of RAM and each VDI VM had a maximum of 2 GB of RAM. Each physical server supports a maximum of 90 VDI VMs, leaving 12 GB of RAM for the operating system.

XenMobile configuration

A third physical server was added to the management cluster to support the XenMobile installation. The installation process followed the Citrix Reference Architecture for mobile devices and app management[4]. The installation focused on the MDM for managing devices and the SQL configuration to support MDM. The installation was not configured with HA, although Citrix recommends an HA configuration. Contact your Citrix Consultant for the best approach to building an HA XenMobile installation. The VMs were configured as follows:

VM	No.of VMs	VHD GB	vCPU	Memory GB
XenMobile Device Manager	1	40	2	4
XenMobile SQL Server	1	40	2	6
App Controllers	1	40	2	4

Test setup and configuration

Summary

The goal of this test was not to determine the maximum number of users that could be supported, but to follow Citrix best practices and ensure that the environment worked for those numbers and recommendations.

For the infrastructure VMs, the second VM was added strictly for HA purposes; a single VM would have been more than sufficient to support the number of users, and this is also true for the two NetScaler appliances.

As stated previously, the HSD/HVD was an 80/20 mix, with the HVD configured 50/50 between random pooled and static pooled with personal vDisk. For the local/remote mix, 80% were configured as local, 20% as remote, and 1000 XenMobile users were configured.

In the testing there was no intention of stressing or investigating the performance of either XenDesktop or XenMobile, but to show that the two could function successfully in the same data center.

[4]https://www.citrix.com/content/dam/citrix/en_us/documents/products/citrix-reference-architecture-for-mobile-device-and-app-management.pdf

Client test tools

To drive the XenDesktop workload, LoginVSI 4.0 was used. 20% of the client launchers were configured to be remote and to connect through the NetScaler; 80% were configured as local users connecting directly to StoreFront. Each client launcher session was configured to support 15 sessions, and each HP BL460c G7 host was configured to support 12 client-launching VMs.

A Citrix-created tool was used to drive the XenMobile workload. This tool simulates a connection between a client device and the App Controller within the data center, creating micro VPN connections through the NetScaler. The tool creates three micro VPNs per connection, so 1000 users create 3000 connections through the NetScaler. With this version of the tool no actual XenMobile applications were started. The test tool simulates IOS, Android, and Windows mobile connections. For our testing a 50/50 mix of IOS and Android connections was used.

Conclusion

The physical servers had 192 GB of memory, which limited the number of hosted virtual desktop (HVD) users that could be supported per physical server. Each HVD was created with 2 GB of memory, so the number of users per server was restricted to 90 to prevent memory over-commit. Sizing under the memory maximum allowed for taking advantage of memory over-commit if conditions or user counts changed on the physical server.

For our configuration of the hosted shared desktop (HSD) VMs, support was set to 50 users per VM. For a different VM configuration the number could successfully be varied.

For XenMobile use, the user count was set to 1000 (approximately 50% of the XenDesktop users in a module). As stated previously the goal was not to maximize the number of XenDesktop and XenMobile users but to establish a range that provides an optimal user experience for the amount of hardware used.

The Citrix-developed test tool that was used to simulate mobile users supports both IOS and Android connections and creates micro VPN connections to the XenMobile App Controllers. A mix of 50/50 IOS and Android connections was used. The tool creates three micro VPN connections per test tool user connection, so 1000 users generate 3000 micro VPN connections. We excluded new user connections, which create five or more micro VPN connections during device registration with the XenMobile Device Manager (XDM). The NetScalers were configured to do SSL offloading.

With the servers assigned and configured in conjunction with the EMC enterprise storage used to support our environment, we were able to support 1800 HSD users and 360 HVD users in our first module, which also supported the infrastructure VMs required to run the environment. This aligned with our aim of 80% HSD users and 20% HVD users. The first module consisted of 16 HP BL460c Gen8 blades: three dedicated to supporting XenDesktop infrastructure (Brokers, SQL databases, license servers, and Provisioning Services servers) running as VMs as well as the XenMobile XDM and App Controller VMs, nine servers to support HSD, and four servers to support HVD.

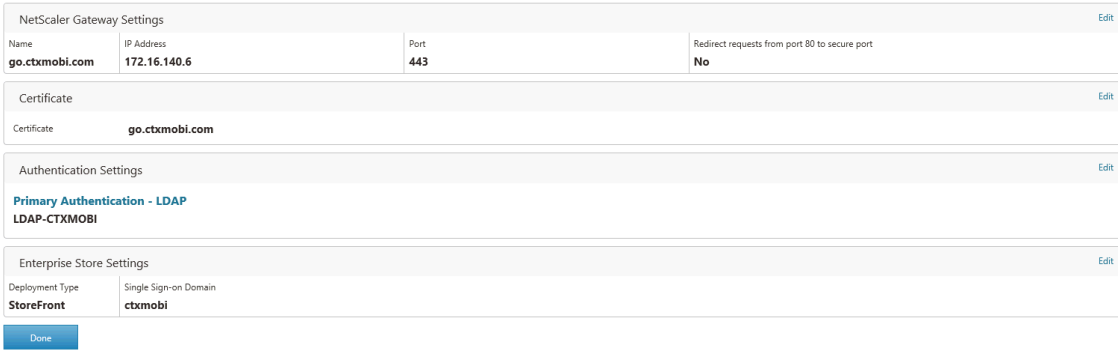
Adding a second module of 16 servers required adding two more Provisioning Services VMs and an additional SCVMM VM. To avoid having to use two servers to support only three infrastructure VMs, the VMs were run on the HSD cluster in the second module. The number of HSD VMs was reduced

by three. For the second module 12 physical servers were in the HSD cluster, supporting 2250 users in 45 HSD VMs and the three infrastructure VMs. Four servers were used to support the HVD, totaling 360 users.

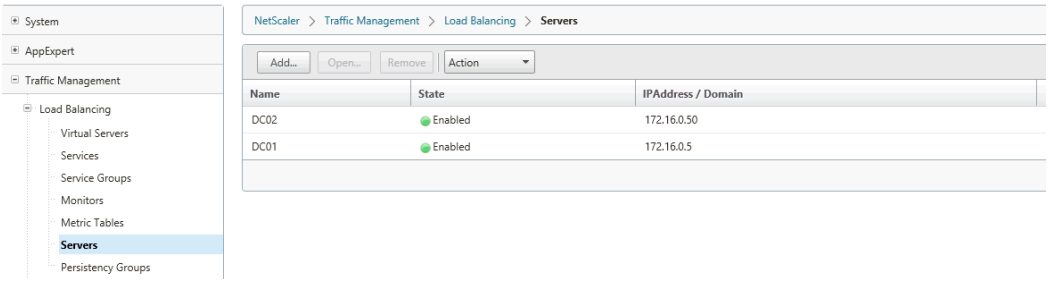
Appendix A: NetScaler configuration screens

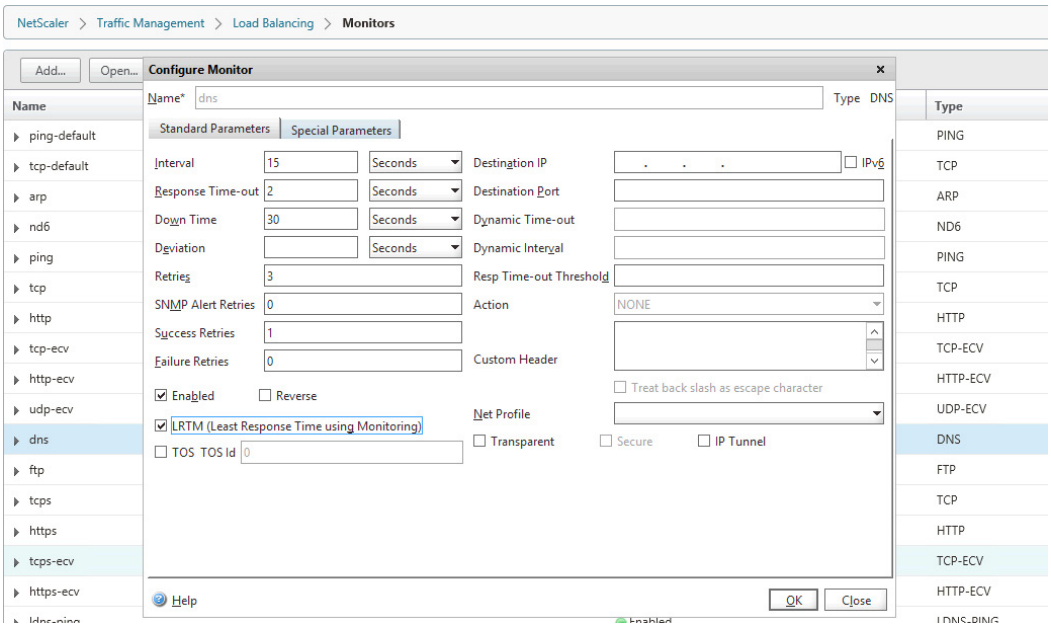
The following screenshots show how the NetScaler was configured.

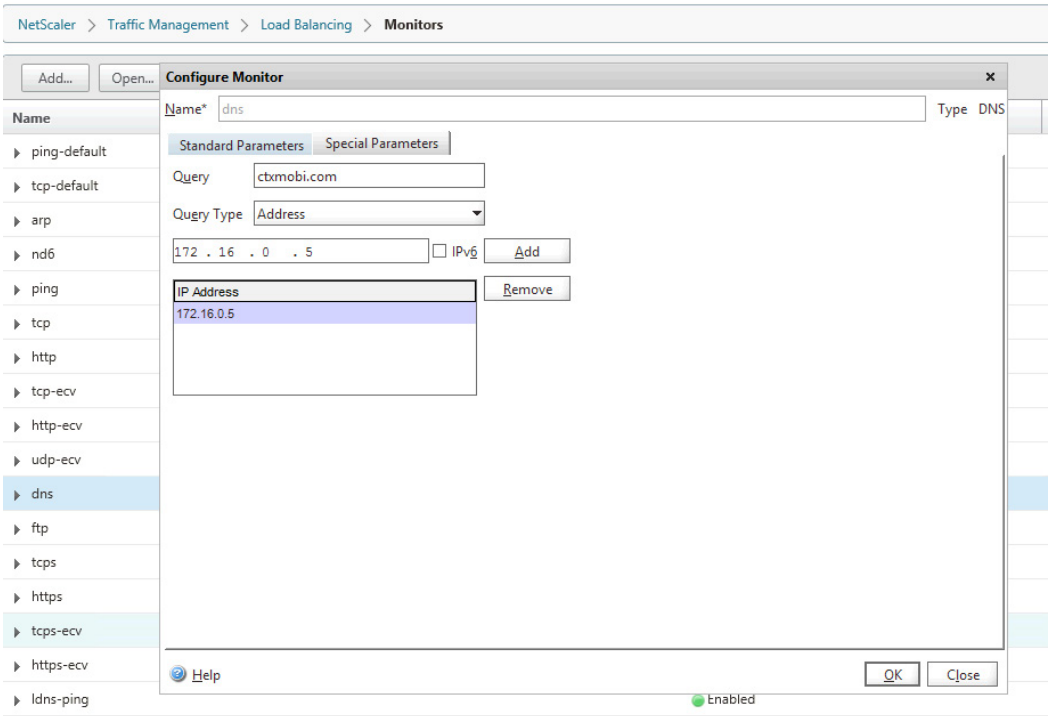
Creating VIP to StoreFront for XenDesktop

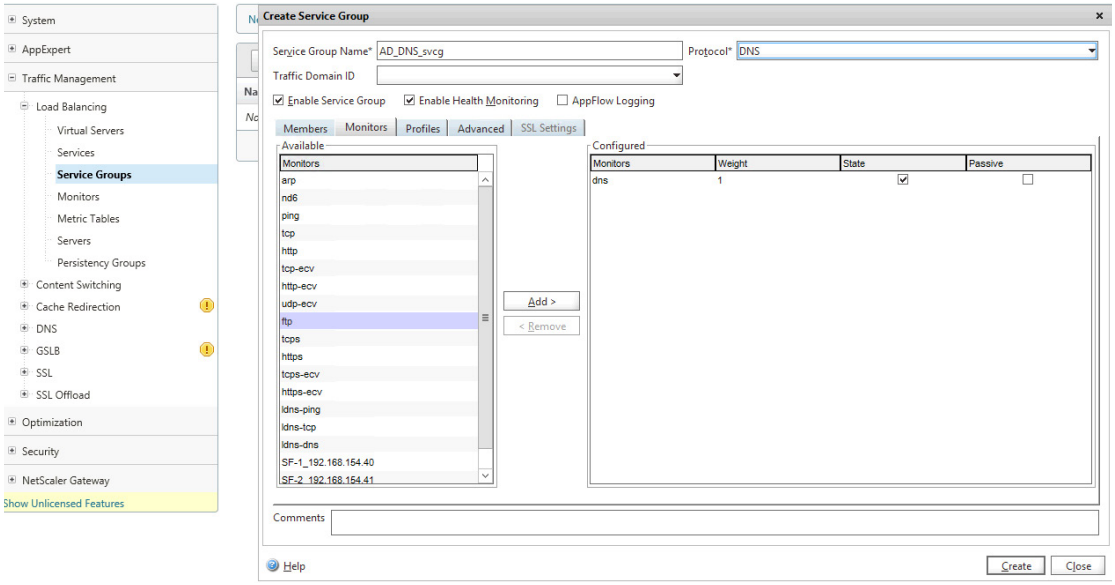


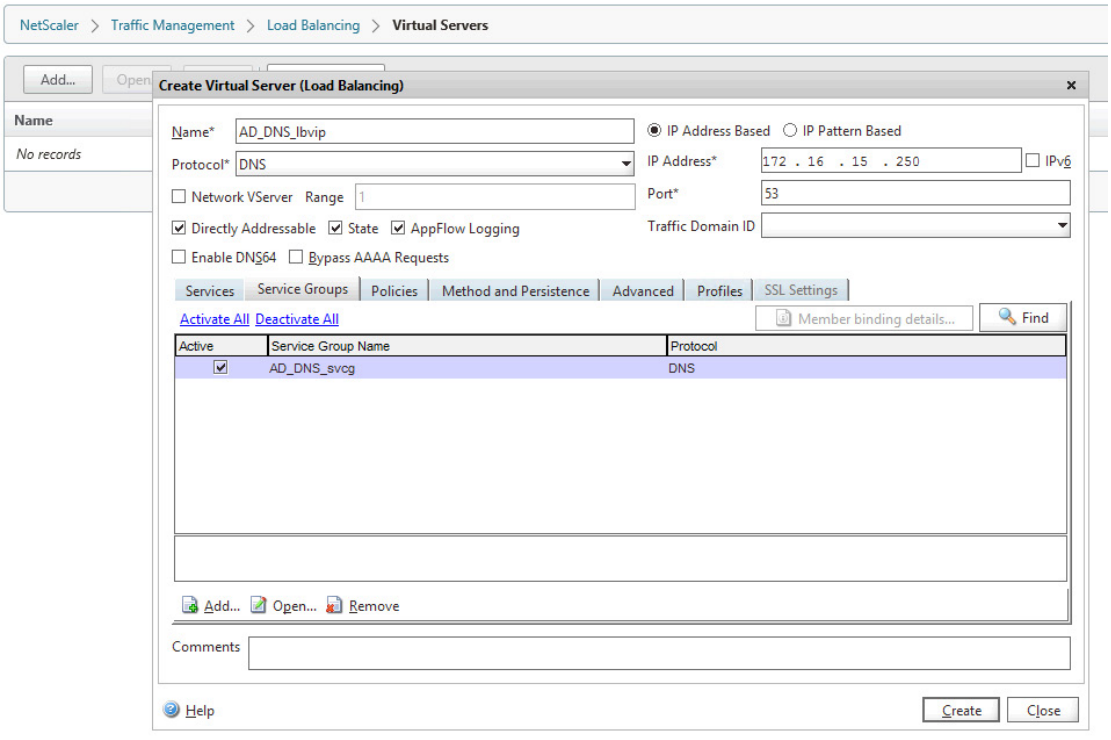
Configuring load balancing

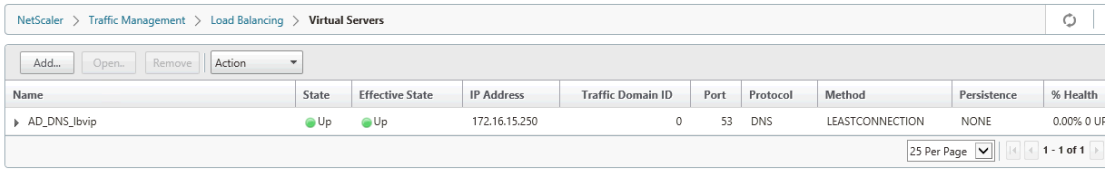


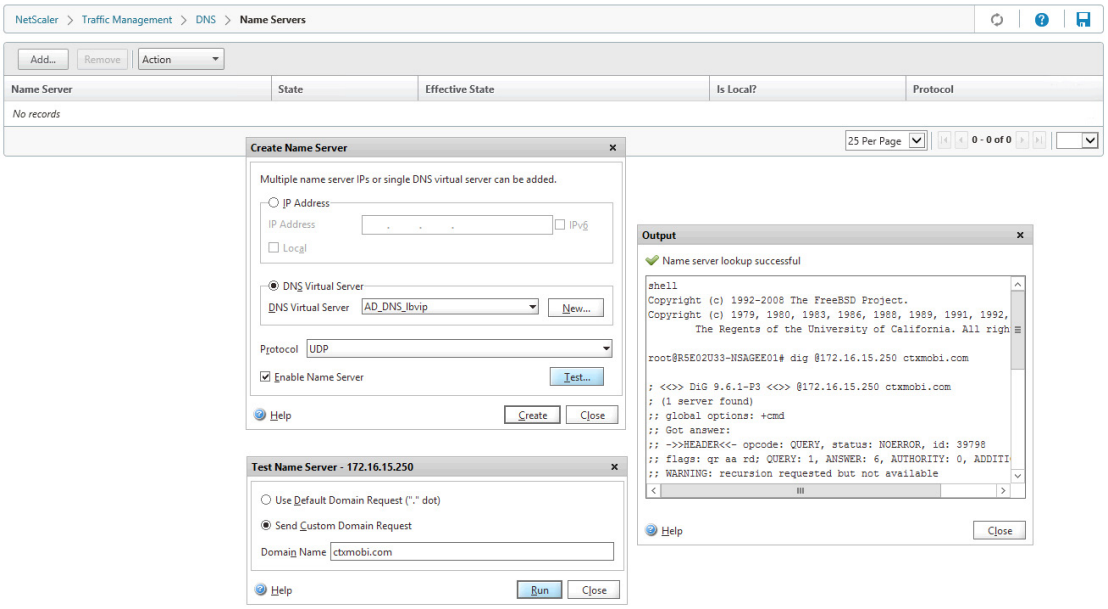





System
AppExpert
Traffic Management
Load Balancing
Virtual Servers
Services
Service Groups
Monitors
Metric Tables
Servers
Persistency Groups
Content Switching
Cache Redirection
DNS
GSLB
SSL
SSL Offload
Optimization
Security
NetScaler Gateway
Show Unlicensed Features
Create Service Group
Service Group Name* AD_DNS_svcg
Protocol* DNS
Traffic Domain ID
Enable Service Group
Enable Health Monitoring
AppFlow Logging
Members
Monitors
Profiles
Advanced
SSL Settings
Available
Monitors
arp
nd6
ping
tcp
http
tcp-ecv
http-ecv
udp-ecv
ftp
tcps
https
tcps-ecv
https-ecv
idns-ping
idns-tcp
idns-dns
SF-1_192.168.154.40
SF-2_192.168.154.41
Add >
< Remove
Configured
Monitors
Weight
State
Passive
dns
1
Comments
Help
Create
Close


NetScaler > Traffic Management > Load Balancing > Virtual Servers
Add...
Name
No records
Create Virtual Server (Load Balancing)
Name* AD_DNS_lbvip
Protocol* DNS
Network VServer Range 1
Directly Addressable
State
AppFlow Logging
Enable DNS64
Bypass AAAA Requests
IP Address Based
IP Pattern Based
IP Address* 172 . 16 . 15 . 250
IPv6
Port* 53
Traffic Domain ID
Services
Service Groups
Policies
Method and Persistence
Advanced
Profiles
SSL Settings
Activate All
Deactivate All
Member binding details...
Find
Active
Service Group Name
Protocol
AD_DNS_svcg
DNS
Add...
Open...
Remove
Comments
Help
Create
Close


NetScaler > Traffic Management > Load Balancing > Virtual Servers
Add...
Open...
Remove
Action
Name
State
Effective State
IP Address
Traffic Domain ID
Port
Protocol
Method
Persistence
% Health
AD_DNS_lbvip
Up
Up
172.16.15.250
0
53
DNS
LEASTCONNECTION
NONE
0.00% 0 UI
25 Per Page
1 - 1 of 1



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