



Dell Wyse Datacenter Executive Brief for



Citrix XenDesktop/ XenApp

02/27/2014
Version 1.3

THIS DOCUMENT IS FOR INFORMATIONAL PURPOSES ONLY, AND MAY CONTAIN TYPOGRAPHICAL ERRORS AND TECHNICAL INACCURACIES. THE CONTENT IS PROVIDED AS IS, WITHOUT EXPRESS OR IMPLIED WARRANTIES OF ANY KIND.

Copyright © 2014 Dell Inc. All rights reserved. Reproduction of this material in any manner whatsoever without the express written permission of Dell Inc. is strictly forbidden. For more information, contact Dell.

Dell, the Dell logo, and the Dell badge are trademarks of Dell Inc. Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and/or other countries. VMware is a registered trademark of VMware, Inc. Citrix and XenDesktop are registered trademarks of Citrix Systems, Inc. Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell Inc. disclaims any proprietary interest in trademarks and trade names other than its own.

Contents

1 Introduction	3
1.1 Why VDI?	3
1.2 What's New in This Release	3
2 Solution Architecture Overview	4
2.1 Introduction	4
2.2 Local Tier 1	4
2.2.1 Local Tier 1 & Tier 2- Combined Pilot.....	4
2.3 Shared Tier 1 Rack	4
2.4 Shared Tier 1 Blade	5
2.5 Solution High Availability	5
3 Hardware Components	6
3.1 Network	6
3.2 Servers	6
3.3 Storage	7
3.3.1 EqualLogic Configuration	7
3.3.2 Compellent Storage (FC)	7
3.4 Dell Cloud Clients	7
3.4.1 Dell Wyse T10D (Basic Workload)	8
3.4.2 Dell Wyse D10D (Standard Workload)	8
3.4.3 Dell Venue 11 Pro	8
3.4.4 Dell Chromebook 11	8
4 Software Components	9
4.1 Citrix XenDesktop v7.....	9
4.1.1 Citrix Personal vDisk Technology.....	9
4.1.2 Citrix Profile Manager	9
4.2 Desktop and Application Delivery with Citrix XenApp	10
4.2.1 XenDesktop with XenApp and PvDisk Integration	10
Appendix- XenMobile, CloudBridge & Netscaler	11
About the Authors	12

1 Introduction

This is the Dell Executive Brief for the Citrix Desktop Virtualization solution designed to scale from 50 to more than 50,000 VDI (Virtual Desktop Infrastructure) users. This document discusses the various components of the VDI solution and highlights the differences between them to offer you all the available options you will need to make a decision based on your individual needs. The solution options encompass a combination of solution models including local disks and storage area networks based either on iSCSI or Fiber Channel technologies and networking options (Ethernet or Fiber Channel) based on those choices.

This document provides a high level overview of the key components of the architecture required to deliver virtual desktops via Citrix XenDesktop 7. We will also discuss how to get started with this technology by exploring a VDI Experience Proof of Concept (POC) aka "pilot" Solution as well as an entry level configuration supporting up to 90 users.

1.1 Why VDI?

Simply put, VDI lets you move your hardware (and headaches associated with it) from the end user site to the datacenter. There are many benefits of this including, but not limited to, security, management, better inventory & logistics, enabling BYOD, enabling remote workers, etc. All this can be done while staying in compliance with an IT or industry security regulations. Having all of your user data in the datacenter means that not only do you not have to worry about losing data or IP theft, your remote teams can collaborate much more efficiently-no need to send large files back and forth across the pond, simply share in seconds what used to take hours or days to share.

1.2 What's New in This Release

This new release features the latest version of Citrix XenDesktop-7.1 along with Windows 8.1 and Windows Server 2012 R2. Also with this release, support has been added for the Dell PowerEdge VRTX system with the remote and branch office deployments in mind. This release also expands out storage offerings by adding support for the Dell EqualLogic 6210 series and making a high performance local tier 1 SSD (Solid State Drive) offering for blade servers. The newly added support for NVIDIA graphics (vGPU) allow us to provide an excellent end user experience to graphics designers and engineers without sacrificing user density. The Dell Wyse endpoints have also been updated. Last, but not least, this release qualifies the Atlantis ILIO solution for high IOPS use cases for demanding workloads.

2 Solution Architecture Overview

2.1 Introduction

The Dell Wyse Datacenter solution leverages a core set of hardware and software components consisting of 4 primary layers:

- Networking Layer
- Compute Server Layer
- Management Server Layer
- Storage Layer

These components have been integrated and tested to provide the optimal balance of high performance and lowest cost per user. Additionally, the Dell Wyse Datacenter solution includes an approved extended list of optional components in the same categories. These components give IT departments the flexibility to custom tailor the solution for environments with unique VDI feature, scale or performance needs. The Dell Wyse Datacenter stack is designed to be a cost effective starting point for IT departments looking to migrate to a fully virtualized desktop environment slowly. This approach allows you to grow the investment and commitment as needed or as your IT staff becomes more comfortable with VDI technologies.

2.2 Local Tier 1

2.2.1 Local Tier 1 & Tier 2– Combined Pilot

In the Local Tier 1 model, VDI sessions execute on local storage on each Compute server. Due to the local disk requirement in the Compute layer, this model supports rack servers only. vSphere or Hyper-V can be used as the solution hypervisor.

We offer a 100 user combined pilot solution to test the waters, so to say. This might entail either a small deployment, or a pilot effort to familiarize yourself with the solution architecture. This architecture is non-distributed with all essential core functions residing on a single server running either vSphere or Hyper-V. If additional scaling is desired, you can grow into a larger distributed architecture seamlessly with no loss on initial investment.

In addition to the 100 user combined offering, we also offer a scale ready version that includes Tier 2 storage. The basic architecture is the same but customers looking to scale out quickly (much faster than the above mentioned solution) will benefit by building out into Tier 2 storage initially.

2.3 Shared Tier 1 Rack

In the Shared Tier 1 model, VDI sessions execute on shared storage so there is no need for local disk on each server. All configuration options are identical except for CPU and RAM which are reduced on the Management host.

For POCs or small deployments, Tier1 and Tier2 can be combined on a single Dell EqualLogic 6210XS storage array. Above 500 users, a separate array needs to be used for Tier 2.

For 500 or more users on EqualLogic, the Storage layers are separated into discrete arrays. Additional 6110XS arrays are added for Tier 1 as the user count scales, just as the Tier 2 array models change also based on scale. The 4110E, 6210E, and 6510E are 10Gb Tier 2 array options. NAS is recommended above 1000 users to provide HA (High Availability) for file services.

Utilizing Compellent storage for Shared Tier 1 provides a fiber channel solution where Tier 1 and Tier 2 are functionally combined in a single array. Tier 2 functions (user data + Mgmt VMs) can be removed from the array if the customer has another solution in place. Doing this will net an additional 30% resource capability per Compellent array for Tier 1 user desktop sessions based on our test results. Scaling this solution is very linear by predictably adding Compellent arrays for every 2000 users, on average.

2.4 Shared Tier 1 Blade

As is the case in the Shared Tier 1 model using rack servers, blades can also be used in a 500 user bundle by combining Tier 1 and Tier 2 on a single 6210XS array. Above 500 users, separate Tier 1 and Tier 2 storage into discrete arrays. Above 1000 users the Storage tiers need to be separated to maximize the performance of the 6210XS for VDI sessions. At this scale we also separate LAN from iSCSI switching. Load balancing and NAS can be added optionally for HA.

2.5 Solution High Availability

High availability (HA) is offered to protect each layers of the solution architecture, individually if desired. Following the N+1 model, additional ToR switches for LAN, iSCSI, or FC are added to the Network layer and stacked to provide redundancy as required, additional compute and management hosts are added to their respective layers, vSphere or Hyper-V clustering is introduced in the management layer, SQL is mirrored or clustered, Citrix Netscaler is leveraged for load balancing, and a NAS device can be used to host file shares. Storage protocol switch stacks and NAS selection will vary based on chosen solution architecture.

The R720-based Dell Wyse Datacenter Solution can support the following maximum user counts per server (PVS or MCS).

Workload	vSphere	Hyper-V
Standard (Win8)	165	170
Enhanced (Win8)	110	120
Professional (Win8)	90	100

3 Hardware Components

3.1 Network

The Dell Force10 S-Series S55, Force10 S60, Force10 S4810 and PowerConnect M6348 are the recommended switches for deploying the Dell Citrix VDI solution in an iSCSI storage environment. Brocade 6510 and M5424 are the recommended switches for deploying the Dell Citrix VDI solution in a Fiber Channel storage environment.

The Dell Force10, PowerConnect and Brocade switches are recommended for Dell Wyse Datacenter deployments of 6000 users or less. For over 6000 users, you can stack them with additional switches. For a bursty network, the Dell Force10 S-Series S60 is recommended since it is equipped with the industry's largest packet buffer (1.25 GB), enabling it to deliver lower application latency and maintain predictable network performance even when faced with significant spikes in network traffic. If you have applications that require 10 Gb/s speeds, the Force10 S4810 is recommended.

3.2 Servers

The rack server platform for the Dell Wyse Datacenter solution is the best-in-class Dell PowerEdge R720 (12G). This dual socket CPU platform runs the fastest Intel Xeon E5-2600 family of processors, can host up to 768GB RAM, and supports up to 16 2.5" SAS disks. The Dell PowerEdge R720 offers uncompromising performance and scalability in a 2U form factor.



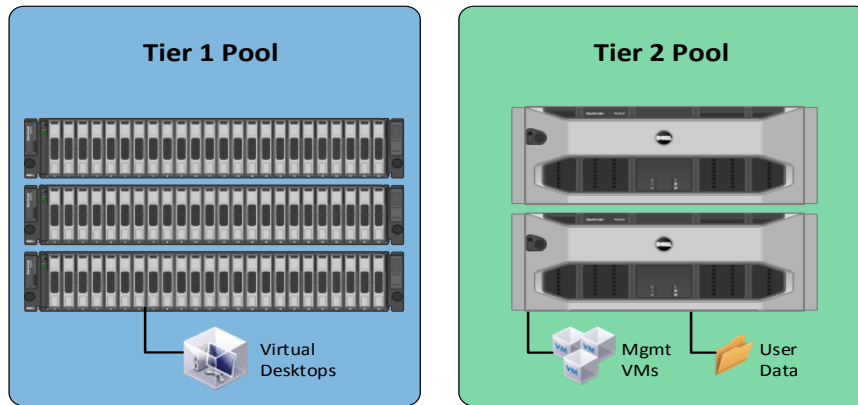
The blade server platform for the Dell Wyse Datacenter solution is the PowerEdge M620. This half-height blade server is a feature-rich, dual-processor platform that offers a blend of density, performance, efficiency and scalability. The M620 offers remarkable computational density, scaling up to 24 cores, 2 socket Intel Xeon processors and 24 DIMMs (768GB RAM) of DDR3 memory in an extremely compact half-height blade form factor.



3.3 Storage

3.3.1 EqualLogic Configuration

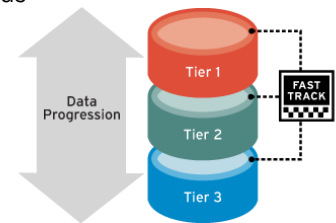
Each tier of EqualLogic storage is to be managed as a separate pool or group to isolate specific workloads. Manage shared Tier 1 arrays used for hosting VDI sessions together, while managing shared Tier 2 arrays used for hosting Management server role VMs and user data together.



3.3.2 Compellent Storage (FC)

Dell Wyse Datacenter for XenDesktop recommends that all Compellent storage arrays be implemented using 2 controllers in an HA cluster. Fiber Channel is the preferred storage protocol for use with this array, but Compellent is fully capable of supporting iSCSI as well. Key Storage Center applications used strategically to provide increased performance include:

- **Fast Track** – Dynamic placement of most frequently accessed data blocks on the faster outer tracks of each spinning disk. Lesser active data blocks remain on the inner tracks. Fast track is well-complemented when used in conjunction with Thin Provisioning.
- **Data Instant Replay** – Provides continuous data protection using snapshots called Replays. Once the base of a volume has been captured, only incremental changes are then captured going forward. This allows for a high number of Replays to be scheduled over short intervals, if desired, to provide maximum protection.



3.4 Dell Cloud Clients

The following Dell cloud clients are the recommended choices for this solution. Thin clients offer greater flexibility in protocol support but require some maintenance since they do have a (tiny) local os-Linux or Windows embedded. Zero clients have no operating system and so offer complete protection against viruses and malware, but they only support one protocol (Citrix or VMware) and so the choice between thin and zero clients will depend on your needs. You also have the options to use either a tablet or a cloud ready device like the Chromebook.

3.4.1 Dell Wyse T10D (Basic Workload)

The T10D features a dual core system-on-a-chip (SoC) design, and a built-in media processor to deliver smooth multimedia, bi-directional audio and Flash playback. The incredibly fast Dell Wyse ThinOS provides no attack surface for secure environments and so your data is not at risk. Boot up in just seconds and log in securely to almost any network. Using only about 7-watts of power in full operation, the T10D is eco-friendly. [Link](#)



3.4.2 Dell Wyse D10D (Standard Workload)



The Dell Wyse D10D is a high-performance and secure ThinOS 8 thin client that is absolutely virus and malware immune. The D10D features an advanced dual-core AMD processor that handles demanding multimedia apps with ease and delivers brilliant graphics. Powerful, compact and extremely energy efficient, the D10D is a great VDI end point for organizations that need high-end performance but face potential budget limitations. For more information, please visit: [Link](#)

3.4.3 Dell Venue 11 Pro



Meet the ultimate in productivity, connectivity and collaboration. Enjoy full laptop performance in an ultra-portable tablet that has unmatched flexibility for a business in motion. This dual purpose device works as a tablet when you're out in the field but also enables you to work on your desktop in the office thanks to an optional dock. For more information, please visit: [Link](#)

3.4.4 Dell Chromebook 11

The lightweight, easy-to-use Dell Chromebook 11 helps turn education into exploration - without the worries of safety or security. Priced to make 1:1 computing affordable today, Chromebook 11 is backed by Dell support services to make the most of your budget for years to come. A high-density battery supported by a 4th Gen Intel® processor provides up to 10 hours of power. Encourage creativity with the Chromebook 11 and its multimedia features that include an 11.6" screen, stereo sound and webcam.



4 Software Components

4.1 Citrix XenDesktop v7

The solution is based on Citrix XenDesktop which provides a complete end-to-end solution delivering Microsoft Windows virtual desktops to users on a wide variety of endpoint devices. Virtual desktops are dynamically assembled on demand, providing users with pristine, yet personalized, desktops each time they log on.

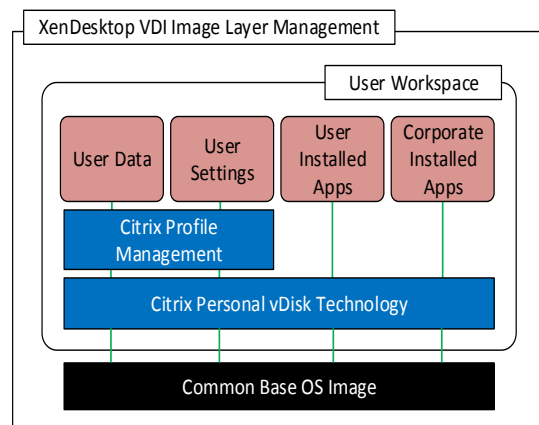
Citrix XenDesktop provides a complete virtual desktop delivery system by integrating several distributed components with advanced configuration tools that simplify the creation and real-time management of the virtual desktop infrastructure.

4.1.1 Citrix Personal vDisk Technology

Citrix Personal vDisk is a high-performance enterprise workspace virtualization solution that is built right into Citrix XenDesktop and provides the user customization and personalization benefits of a persistent desktop image, with the storage savings and performance of a single/shared image.

With Citrix Personal vDisk, each user receives personal storage in the form of a layered vDisk, which enables them to personalize and “persist” their desktop environment.

Additionally, this vDisk stores any user or departmental apps as well as any data or settings the VDI administrator chooses to store. Personal vDisk provides the following benefits to XenDesktop:



- Persistent personalization of user profiles, settings and data.
- Enables deployment and management of user installed and entitlement based applications
- Fully compatible with Application delivery solutions such as Microsoft SCCM, App-V and Citrix XenApp.
- 100% persistence with VDI pooled Storage management
- Almost Zero management overhead.

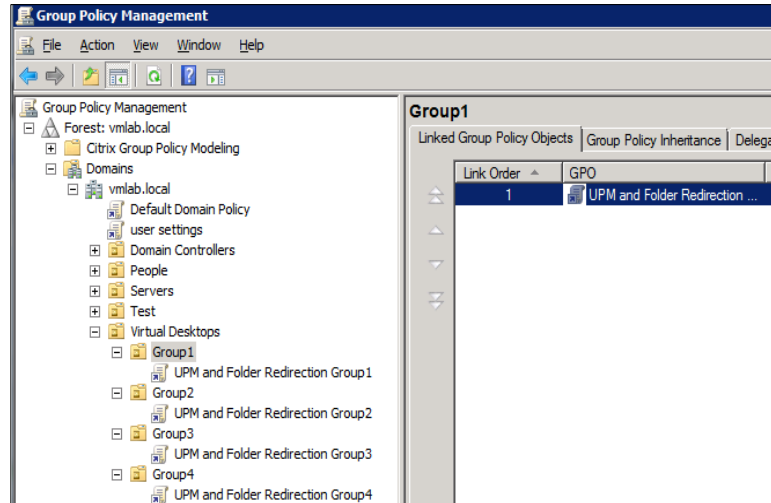
4.1.2 Citrix Profile Manager

Citrix Profile Management is a component of the XenDesktop suite which is used to manage user profiles and minimize many of the issues associated with traditional Windows Roaming profiles in an environment where users may have their user profile open on multiple devices at the same time. The profile management toolset has two components, the profile management agent which is installed on any device where the user profiles will be managed by the toolset, which will be the virtual desktops. The second component is a Group Policy Administrative Template, which is imported to a group policy which is assigned to an

organizational unit within active directory which contains the devices upon which the user profiles will be managed.

In order to further optimize the profile management folders within the user profile that can be used to store data will be redirected the users' home drive. The folder redirection will be managed via group policy objects within Active Directory. The following folders will be redirected:

- Contacts
- Downloads
- Favorites
- Links
- My Documents
- Searches
- Start Menu
- Windows
- My Music
- My Pictures
- My Videos
- Desktop



4.2 Desktop and Application Delivery with Citrix XenApp

The Dell Wyse Datacenter solution has been expanded to include integration with Citrix XenApp. XenApp's proven architecture and virtualization technologies enable customers to instantly deliver any Windows-based application to users anywhere on any device.

XenApp perfectly complements a XenDesktop-based VDI deployment by enabling the delivery of applications within a user's virtual desktop. This gives the user a customized application set with a "locally-installed" application experience even though the applications are centrally installed and managed on XenApp servers. This can dramatically simplify their XenDesktop environment by leveraging a widely shared virtual desktop image, while at the same extending the scalability of XenDesktop by alleviating the desktop 'compute' servers from virtually all application loads by only having to run an instance of Citrix Receiver. This two-tiered approach to desktop and application delivery brings management simplification, a much quicker return on investment and the absolute best end-user experience.

4.2.1 XenDesktop with XenApp and PvDisk Integration

In a XenApp implementation, applications and desktops execute from a centralized Windows-based server and then are accessed via the Citrix ICA protocol and Citrix Receiver client plug-in. There are some instances, however, where certain departmental or custom applications cannot run hosted on a Windows server. At the same time for organizational policy or certain storage considerations, delivering these applications as a part of a base image is not possible either. In this case, Citrix PvDisk technology is the solution.

With Citrix Personal vDisk, each user of that single shared virtual desktop image also receives a personal layered vDisk, which enables the user to not only personalize their desktop, but provides native application execution within a Windows client OS and not from a server. When leveraging the integration of XenApp within XenDesktop, all profile and user data is seamlessly accessed within both environments.

Appendix- XenMobile, CloudBridge & Netscaler

The following sections explain some of the ancillary (optional) components offered to ease certain pain points like mobile device management, branch office WAN optimization & application acceleration as well as load balancing and disaster recovery. Depending on your environment, they may or may not be needed and are hence listed in the optional section.

Citrix XenMobile

Citrix XenMobile is a comprehensive solution to manage mobile devices, apps, and data while giving users the freedom to experience work and life their way. The solution includes configure, secure, provision and support mobile devices with MDM (Mobile Device Manager) and mobile app management with the largest ecosystem of apps built for business. Available for any mobile device, Citrix Worx Home is an app that allows IT to enforce mobile settings and security while also providing access to a unified app store and live support services. ShareFile, which is included and seamlessly integrated with XenMobile, is a solution that enables organizations to securely store, sync and share data, both within and outside the organization.

Citrix CloudBridge

Citrix CloudBridge provides a unified platform that connects and accelerates applications, and optimizes bandwidth utilization across public cloud and private networks. The only WAN optimization solution with integrated, secure, transparent cloud connectivity, CloudBridge allows enterprises to augment their datacenter with the infinite capacity and elastic efficiency provided by public cloud providers. **For more information please visit: [Citrix CloudBridge](#)**

Citrix Netscaler

Citrix NetScaler is an all-in-one web [application delivery controller](#) that makes applications run five times better, reduces web application ownership costs, optimizes the user experience, and makes sure that applications are always available. It does so by utilizing [HTTP compression](#) & [caching](#), providing an advanced L4-7 [load balancer](#), an integrated [AppFirewall](#) and server offloading to consolidate servers.

Where Does a Citrix NetScaler Fit in the Network?

A NetScaler resides between the clients and the servers, so that client requests and server responses pass through it. In a typical installation, virtual servers (vservers) configured on the NetScaler provide connection points that clients use to access the applications behind the NetScaler. In this case, the NetScaler owns public IP addresses that are associated with its vservers, while the real servers are isolated in a private network.

XenDesktop HA with Netscaler White Paper: [High Availability](#)

About the Authors

Peter Fine is the Sr. Principal Engineering Architect for Citrix-based solutions at Dell. Peter has extensive experience and expertise on the broader Microsoft, Citrix and VMware solutions software stacks as well as in enterprise virtualization, storage, networking and enterprise datacenter design.

Rick Biedler is the Solutions Development Manager for Citrix solutions at Dell, managing the development and delivery of Enterprise class Desktop virtualization solutions based on Dell Datacenter components and core virtualization platforms.

Cormac Woods is a Sr. Solution Engineer in the Dell Cloud client-computing group building, testing, validating, and optimizing enterprise VDI stacks.

Geoff Dillon is a Sr. Solutions Engineer in the Dell Cloud client-computing group with deep Citrix experience and validation expertise of Dell's Dell Wyse Datacenter VDI solutions.

Pranav Parekh is a Sr. solutions engineer in the Dell Cloud client-computing group. Pranav has extensive experience designing desktop virtualization solutions, IaaS private cloud solutions, virtualization solutions, and enterprise class blade servers. Pranav has a master's degree in Electrical & Computer Engineering from the University of Texas at Austin.

Manish Chacko is a Sr. Technical Marketing Advisor for Citrix-based solutions at Dell. Before writing about technology, Manish has spent time designing, implementing and supporting technology- in IT, Systems Engineering & Network Performance/Monitoring. Manish has been a long-time Dell customer & Advocate before becoming a Dell employee.