Citrix XenDesktop 7.1 with Nutanix on Microsoft Hyper-V Server® 2012 High-Level Design

Technical Summary of the Citrix Validated Solution

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This is the technical summary of the detailed Citrix Validated Solution. For more information on the results of this technical summary, please contact Nutanix at info@nutanix.com.
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1. Executive Summary

1.1 Audience
This reference architecture document is created as part of a Citrix Validated Solution (CVS) and is intended to describe the detailed architecture and configuration of the components contained within. Readers of this document should be familiar with Citrix XenDesktop, its related technologies and the foundational components; Nutanix and Microsoft Hyper-V Server® 2012 R2.

1.2 Purpose
The purpose of this document is to provide high-level design information that describes the architecture for this Citrix Validated Solution which is based on Citrix Hosted Shared Desktop (HSD) and Citrix Hosted Virtual Desktop (HVD) FlexCast models. The solution is built on Nutanix compute and Storage, along with Arista switching.

1.3 Reference Architecture
In order to facilitate rapid and successful deployments of the Citrix XenDesktop FlexCast models described in this document, Citrix Consulting APAC have procured, built and tested a solution built on Nutanix Virtual Computing Platform. The Citrix Validated Solution provides prescriptive guidance on Citrix, Nutanix design, configuration and deployment settings thereby allowing customers to quickly deliver virtual desktop workloads.

Extensive testing was performed using Login VSI to simulate real-world workloads and determine optimal configurations for the integration of components that make up the overall solution.
2. Architecture Overview

This Citrix Validated Solution and its components was designed, built and validated to support two distinct Citrix virtual desktop types. Each desktop type is described to support up to 1,000 user desktop sessions:

- **Hosted Shared Desktops.** Up to 1,000 individual user sessions running XenDesktop Hosted Shared Desktops on Windows Server 2008 R2 Remote Desktop Session Hosts or
- **Hosted Virtual Desktops.** Up to 1,000 individual XenDesktop Hosted Virtual Desktops running Windows 7 Enterprise x64.

Each of these desktop types is described in the Citrix FlexCast model operating as virtual machine instances on Microsoft Hyper-V Server® 2012 R2. This architecture is a single, self-supporting modular component identified as a Block, supporting up to 1,000 users allowing customers to consistently build and deploy scalable environments.

2.1 Citrix Virtual Desktop Types

This Citrix Validated Solution document references Citrix Hosted Shared Desktops and Hosted Virtual Desktops (HVD). Both types of virtual desktops are discussed below for reference. For more information, refer to Citrix FlexCast delivery methods [http://flexcast.citrix.com/](http://flexcast.citrix.com/)

- **Hosted Shared Desktop (HSD).** A Windows Remote Desktop Session (RDS) Host using Citrix XenDesktop to deliver Hosted Shared Desktops in a locked down, streamlined and standardised manner with a core set of applications. Using a published desktop on to the Remote Desktop Session Host, users are presented a desktop interface similar to a Windows 7 “look and feel”. Each user runs in a separate session on the RDS server.

- **Hosted Virtual Desktop (HVD) aka Hosted VDI.** A Windows 7 desktop instance running as a virtual machine where a single user connects to the machine remotely. Consider this as 1:1 relationship of one user to one desktop. There are differing types of the hosted virtual desktop model (existing, installed, pooled, dedicated and streamed). This document exclusively refers to the pooled type of HVD.

This document will discuss the Citrix Validated Solution for both Hosted Shared Desktops and Hosted Virtual Desktops (pooled desktops). Throughout this document nomenclature may reference the FlexCast model as; “*<FlexCast model>”* which should be substituted for either HSD or HVD as appropriate to the design under consideration.

2.2 The Block Concept

The term “block” is referenced throughout this solution design. In the context of this document a block is a known entity, an architecture that has been pre-tested and validated. A block consists of the hardware and software components required to deliver 1,000 virtual desktops using either FlexCast model.

For clarity this document does not attempt to describe combining both FlexCast models, it specifically discusses each type as its own entity.

The block prescribes the physical and logical components required to scale out the number of desktops in increments of 1,000 users or part thereof.
2.3 Justification and Validation

The construct of this Citrix Validated Solution is based on many decisions that were made during validation testing. Testing was carried out using the Login VSI Virtual Session Index (VSI), an industry standard tool for user / session benchmarking. Login VSI allows comparisons of platforms and technologies under the same repeatable load. The “Medium” VSI workload is expected to approximate the average office worker during normal activities and was the workload used throughout testing.

In addition to Login VSI, Liquid Ware Labs – Stratusphere was also deployed on the workloads to capture HSD and HVD metrics, to help quantify resource consumption and baseline overall results. This supplementary tool provided a more rounded performance validation on the solution described in this paper.
2.4 High Level Solution Overview

The diagram below depicts the Citrix XenDesktop Hosted Shared Desktop technology stack.

Baseline Enterprise Applications

Windows 2008 R2 Virtual Machine Workloads

Citrix Desktop Virtualisation Software

Nutanix Virtual Computing Platform

Figure 1. Solution Stack – Hosted Shared Desktop Workload

The diagram below depicts the Citrix XenDesktop Hosted Virtual Desktop technology stack.

Baseline Enterprise Applications

Windows 7 Enterprise Virtual Machine Workloads

Citrix Desktop Virtualisation Software

Nutanix Virtual Computing Platform

Figure 2. Solution Stack – Hosted Virtual Desktop Workload
- **Citrix XenDesktop.** Two virtualised Citrix Delivery Controller servers were deployed to support the XenDesktop Site. A single XenDesktop Site will be utilised to manage the initial 1,000 desktop block. Additional desktop blocks and supporting hardware can be deployed, to scale out the XenDesktop Site to thousands of virtual desktops.

- **Virtual Desktops.** This solution will focus on the delivery of the two virtual desktop types:
  - Hosted Virtual Desktops (HVD). Describing the delivery of a 1,000 Pooled Windows 7 virtual desktops powered by Citrix XenDesktop 7.1.
  - Hosted Shared Desktops (HSD). Describing the delivery of a 1,000 Shared desktop based on Microsoft Windows Server 2008 R2 Remote Desktop Session host workloads powered by Citrix XenDesktop 7.1.

- **Microsoft Hyper-V Server 2012 R2 (Hyper-V Server Core).** The hypervisor selected to host the virtualised desktop and server instances for this solution is Microsoft Hyper-V Server 2012® R2 Server Core. Hyper-V were deployed onto the Nutanix Virtual Computing Platform through Nutanix’s Foundation Deployment Tool.

- **Virtual Machine Workload Provisioning.** This document describes the use of Citrix Machine Creation Services:
  - Machine Creation Services (MCS). Desktop and Server OS workloads were provisioned via XenDesktop Machine Creation Services (MCS) integrated to the Citrix XenDesktop 7.1. The base image of the Desktop and Server OS contains the optimised operating system and Tier-1 application set.

- **Applications.** Tier-2 applications which may include line of business or customer specific applications that are not embedded as part of the base image, however it can be delivered using Citrix XenDesktop RDS workloads or Microsoft App-V.

- **Citrix StoreFront.** Virtualised StoreFront servers were deployed to provide application and desktop resource enumeration.

- **Citrix Performance Management.** Citrix Director and EdgeSight can provide comprehensive monitoring capabilities of the virtual desktops and user sessions.

- **Nutanix Virtual Computing Platform.** The hardware platform of choice is Nutanix NX-3060 node which consists of 20 core Intel Xeon Ivy Bridge CPU processors, 256GB RAM and a mix of SSD and HDD storage. A Nutanix Block consists of four individual NX-3060 nodes and is referred to as NX-3460. The Hyper-V servers were part of the solution and integrated to the Nutanix hardware through Nutanix’s Foundations Deployment Tool.

- **Arista Networks.** Arista Networks was chosen based on its capabilities and innate low-cost enterprise solution. This model chosen for this solution comprised of two Arista 7150s with 24 x 10GbE ports as well as a single Arista 7048-A for physical Nutanix node management.

- **Supporting Infrastructure.** The following components are assumed to exist within the customer environment and are required infrastructure components:

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1 The solution design for Tier-2 applications delivered by Citrix XenDesktop or Citrix XenApp is out of scope for this document.

2 The solution design of Microsoft App-V components is out of scope for this document.
- Microsoft Active Directory Domain Services
- A suitable Microsoft SQL database platform to support the solution database requirements.
- Licensing servers to provide Microsoft licenses are assumed to exist
- DHCP Server with sufficient IP addresses required for the HVD workloads

This design document will focus on the desktop virtualisation components which include the desktop workload, desktop delivery mechanism, hypervisor, hardware, network and storage platforms.

### 2.5 Assumptions

The following assumptions have been made:

- Required Citrix and Microsoft licenses and agreements are available
- Required power, cooling, rack and data centre space is available
- No network constraints that would prevent the successful deployment of this design
- Microsoft Windows Active Directory Domain services are available
- Microsoft System Center Virtual Machine Manager 2012
- Microsoft SQL Database platform is available
3. Logical Architecture

3.1 Logical Component Overview for HVD

The logical components that make up the requirements to deliver a 1,000 user XenDesktop Hosted Virtual Desktop solution are described in the illustration below:

![Logical Component Overview](image)

Figure 3. Hosted Virtual Desktops - Logical Component View

The following Citrix components are required:

- Citrix XenDesktop – Hosted Virtual Desktop virtualisation platform
- Citrix Machine Creation Services – Workload delivery platform for Hosted Virtual Desktops
- Citrix User Profile Management - User personalisation
- Citrix StoreFront – XenDesktop resource enumeration
- Citrix License Server – Pooled management of Citrix licenses
- Performance Management – Citrix Director and EdgeSight
3.2 Logical Component Overview for HSD

The logical components that make up the requirements to deliver a 1,000 user XenDesktop Hosted Shared Desktop solution are described in the illustration below:

![Diagram of logical components](image)

Figure 4. Hosted Shared Desktops - Logical Component View

The following Citrix components are required:

- Citrix XenDesktop – Hosted Shared Desktop virtualisation platform
- Citrix Machine Creation Services – Workload delivery platform for Virtual Desktops
- Citrix User Profile Management - User personalisation
- Citrix StoreFront – XenDesktop resource enumeration
- Citrix License Server – Pooled management of Citrix licenses
- Performance Management – Citrix Director and EdgeSight
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