Reference Architecture

Omnissa Horizon 8 on VMware Cloud Foundation

vmware

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Executive Summary

Business Case

The integration of Horizon 8 with VMware Cloud Foundation (VCF) represents a significant advancement in Virtual Desktop Infrastructure (VDI). It transforms VDI from a traditionally complex, siloed deployment model into a streamlined, agile, and cost-efficient turnkey solution. This unified, hyper-converged platform is purpose-built to align with mission-critical business objectives, delivering unmatched performance, scalability, and resiliency for today's digital workforce.

This white paper presents a validated reference architecture that significantly elevates VDI efficiency and user experience through two key innovations native to the VCF stack:

- **Enhanced VM Density and Cost Reduction**: By leveraging vSAN Express Storage Architecture (ESA) and Memory Tiering, the solution doubles virtual machine (VM) density per host. This maximizes hardware utilization and significantly reduces the cost per user. VCF's deep integration with modern hardware, such as multi-core CPUs and NVMe flash, ensures high-throughput, low-latency performance capable of meeting the demands of even the most intensive VDI workloads.
- **Simplified Profile Management and Resilience**: The architecture eliminates the need for separate file share infrastructure by natively integrating FSLogix Cloud Cache with vSAN File Services. This provides highly available, persistent user profile storage with minimal operational overhead, resulting in a resilient, non-persistent VDI model that simplifies the entire desktop lifecycle, from rapid provisioning to seamless retirement.

This document provides detailed design and sizing guidance, a solution validation report, and best practices to help enterprise architects and administrators confidently deploy Horizon desktops on VMware Cloud Foundation.

Business Values

Here are the top five benefits to deploy Horizon on VMware Cloud Foundation (VCF) with vSAN Express Storage Architecture (ESA):

- **Automated and Agile Operations**: VCF automates the entire infrastructure stack, from initial provisioning to ongoing lifecycle management and patching. This reduces operational risk and accelerates your time-to-value by replacing manual, multi-day deployment processes with full orchestration.
- **Extreme Performance and Efficiency**: The vSAN ESA offers up to 4x higher performance with the space efficiency of RAID-5/6, giving you RAID-1 speeds with significantly less capacity overhead. This superior design leads to high utilization and can reduce your Total Cost of Ownership (TCO) by up to 40%
- **Maximized VM Density**: The system leverages Memory Tiering to achieve a reliable 2x increase in VM density per host. This capability dramatically boosts hardware utilization, allowing you to run more virtual desktops on less infrastructure.
- **Always-On User Profile Resilience**: Native integration of FSLogix Cloud Cache with vSAN File Service eliminates the need for complex, external file servers for user profiles. This powerful combination ensures a seamless, uninterrupted "always-on" user experience, even during storage or network issues.
- **Ready-for-anything resilience**: vSAN ESA enhances resilience by utilizing reduced failure domains and integrating fast, scalable native snapshots. This drastically improves data availability and accelerates backup/restore workflows for the VDI environment.

Key Results

This reference architecture showcases VMware Cloud Foundation leveraging vSAN Express Storage Architecture (ESA) to operate and manage VMware Horizon 8 2306. Key results can be summarized as shown in Table 1.

Note: The performance results in this solution are validated on the HCI platform of vSAN Express Storage Architecture on Lenovo ThinkAgile VX Series, which is also applied to general VMware vSAN Express Storage Architecture ReadyNodes with the similar configurations.

Table 1. Key Results

1600 instant clones provisioned		24 minutes
1600 instant clones new image		42 minutes
1600 Instant clones deleted		28 minutes
1600 Instant clones		VSIbase: 624 VSImax v4.1 average: 969 VSImax reached: No
memory tiering		2x VM density increase, 0-8% performance loss

Audience

This reference architecture is intended for customers—IT architects, consultants, and administrators—involved in the early phases of planning, design, and deployment of VDI solutions using VMware Horizon running on VMware Cloud Foundation. It is assumed that the reader is familiar with the concepts, administration and operations of Horizon, VMware vSphere®, VMware vSAN and related components.

Technology Overview

Solution technology components are listed below:

- VMware Cloud Foundation
- VMware vSAN Express Storage Architecture
- VMware Horizon 8 2306
- FSLogix Cloud Cache

VMware Cloud Foundation

VMware Cloud Foundation (VCF) is a private cloud platform that delivers public cloud scale and agility with on-premises security, resilience and performance, while lowering total cost of ownership.

VMware Cloud Foundation ® can help you accelerate digital innovation with faster infrastructure modernization, a unified cloud experience, along with stronger cyber resilience and platform security.

VCF delivers a consistent private cloud experience across any environment whether it's a customer managed data center, edge location or any cloud endpoint. VCF supports both traditional as well as modern workloads such as containers and AI/ML workloads, and brings modern applications faster to the market with self-service IaaS consumption experience for the application teams.

VMware vSphere is VMware's virtualization platform, which transforms data centers into aggregated computing infrastructures that include CPU, memory, storage, and networking resources. vSphere manages these infrastructures as a unified operating environment and provides operators with the tools to administer the data centers that participate in that environment. The two core components of vSphere are ESXi™ and vCenter Server®. ESXi is the hypervisor platform used to create and run virtualized workloads. vCenter Server is the management plane for the hosts and workloads running on the ESXi hosts.

Memory Tiering over NVMe

Memory Tiering over NVMe (Memory Tiering) allows you to add memory capacity to an ESX host by using NVMe devices installed locally on the ESX host as tiered memory. It optimizes performance by intelligently allocating VM memory to either NVMe devices or faster dynamic random access memory (DRAM) in the ESX host.

Memory Tiering combines DRAM (Tier 0) with the slower NVMe memory (Tier 1) to provide contiguous memory. Memory pages from NVMe are used only for VM memory allocations on an ESX host.

With the Memory Tiering feature, you can increase the workload capacity with a minimal impact on performance. This allows you to add more VMs and workloads to the ESX host, thereby better utilizing the available CPU resources.

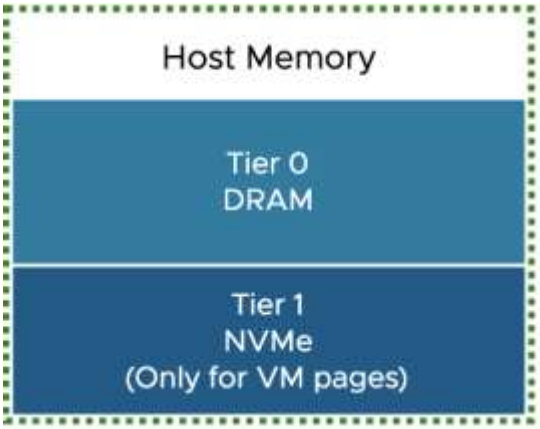

Figure 1. Memory Tiering over NVMe

VMware vSAN Express Storage Architecture

vSAN introduced Express Storage Architecture as an optional, alternative storage architecture to the vSAN original storage architecture. When running on qualified hardware in approved vSAN ReadyNode, the vSAN Express Storage Architecture offers supreme levels of performance, scalability, resilience, and data services without compromising performance. The vSAN Express Storage Architecture unlocks the capabilities of modern hardware to allow the workloads of today and tomorrow perform as the hardware allows.

vSAN Express Storage Architecture evolves beyond the concept of disk groups, discrete caching, and capacity tiers, enabling users to claim storage devices for vSAN into a "storage pool" where all devices are added to a host's storage pool to contribute to the capacity of vSAN. This improves the serviceability of the drives and the data availability management and helps drive down costs. A new fast and efficient data path paired with an efficient and resilient data structure gives our users the ability to store and access data fast and efficiently. It also provides an all-new snapshot engine that meets high-level performance and scalability while remaining fully compatible for use with our ISV partners who provide backup solutions. And finally, vSAN Express Storage Architecture makes administering an environment simpler by improving how devices contribute as a storage resource to the cluster.

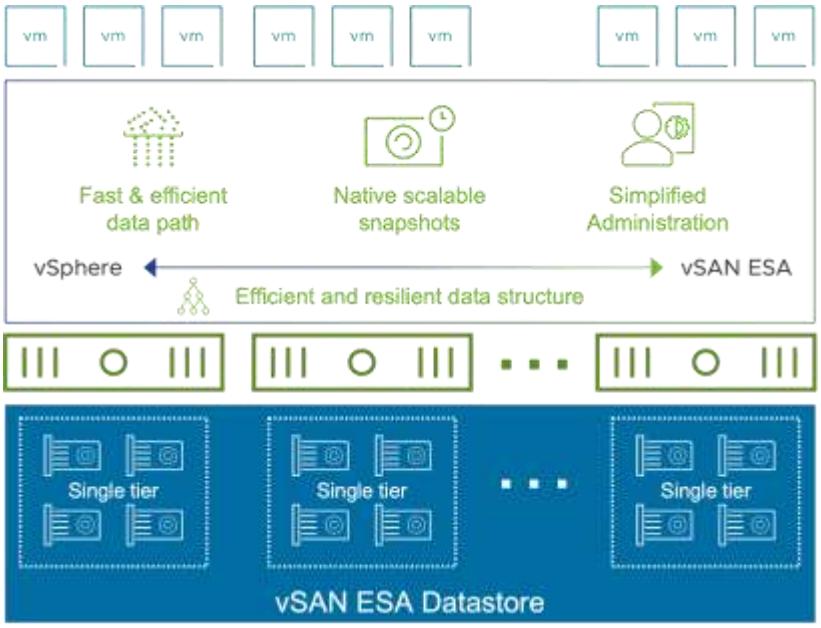

Figure 2. VMware vSAN Express Storage Architecture

Omnissa Horizon 8

Horizon securely delivers virtual desktops and applications, enabling a seamless digital workspace experience from on-premises to the cloud. It provides an adaptable, cloud-ready platform that modernizes desktop operations with best-in-class management and end-to-end security. Horizon integrates with the VMware ecosystem to build a complete digital foundation.

Horizon 8 2306 empowers today's distributed workforce with robust remote work capabilities and enhanced security, while giving IT teams centralized control. It allows IT to centrally run and deliver remote desktops and applications from the data center. Users access a personalized desktop environment on any device, anywhere. Admins gain centralized control, efficiency, and security with desktop data in the data center.

FSLogix Cloud Cache

FSLogix enhances and enables a consistent experience for Windows user profiles in virtual desktop computing environments. FSLogix isn't limited to virtual desktop environments, but could be used on physical desktops where a more portable user experience is desired.

Here are a few things that FSLogix provides:

- Roam user data between remote computing session hosts.
- Minimize sign in times for virtual desktop environments.
- Optimize file I/O between host/client and remote profile store.
- Provide a local profile experience, eliminating the need for roaming profiles.
- Simplify the management of applications and 'Gold Images'.

Cloud Cache is a powerful feature that redefines profile management in virtual desktop environments. Working in conjunction with Profile and Office Containers, it provides crucial resiliency and high availability by replacing static, single-location redirection with a dynamic, active-active redundancy model.

Solution Configuration

This section introduces the resources and configurations:

- Architecture diagram
- Hardware resources
- Software resources
- Virtual Machine Test Image Build
- Network configuration
- Storage configuration
- Horizon Configuration Setting

Architecture Diagram

In this solution, we designed and validated Horizon desktops running on VMware Cloud Foundation to demonstrate unprecedented performance capability, scalability, and resiliency.

vSAN Express Storage Architecture is designed for excellent performance scalability, available data resiliency and rich data services by taking advantage of modern hardware such as fast/efficient NVMe drives and 25/100Gbe networks.

As shown in Figure 3, the solution architecture places Horizon infrastructure VMs and the LoginVSI benchmark VMs (management and launchers) on the Management Domain cluster. The Horizon 2306 desktop pools are deployed to a separate Workload Domain cluster powered by vSAN Express Storage Architecture (ESA).

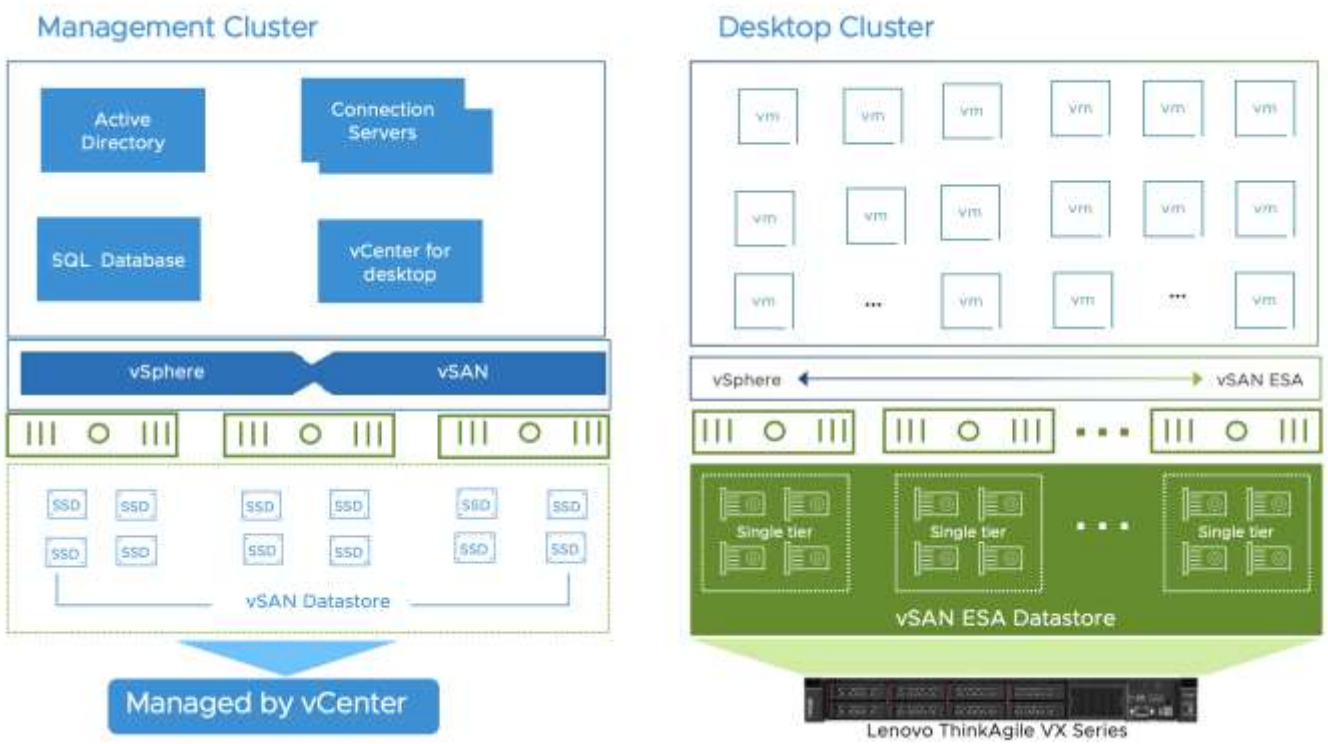

Figure 3. Architectural Diagram

Hardware Resources

Table 2. Hardware Configuration

PROPERTY	SPECIFICATION
Server model name	8 x Lenovo ThinkAgile VX7576 Node
CPU	2 x AMD EPYC 7453 28-Core Processor
RAM	1024 GB
Network adapter	Mellanox Technologies MT2892 Family [ConnectX-6 Dx], 100 Gbits/s full duplex
Storage adapter	NVMe DC SSD [3DNAND, Sentinel Rock Controller]
Disks	6 x 6.4TB Micron 7450 NVMe SSD storage with max endurance on each host

Software Resources

Table 3 shows the software resources used in this solution.

Table 3. Software Resources

Software	Version	Purpose
VMware Cloud Foundation	9.0	VMware Cloud Foundation (VCF) is an integrated, full-stack software platform that combines software-defined compute (vSphere), storage (vSAN), networking (NSX), and cloud management into a unified solution. It provides a consistent, automated cloud operating model for running both traditional and modern containerized applications across private, public, and edge environments.
VMware Horizon 8	2306	VMware Horizon 8 is a Virtual Desktop Infrastructure (VDI) platform that allows organizations to deliver and manage virtualized Windows and Linux desktops, as well as applications, from on-premises data centers or the cloud.
Windows Server 2022	Datacenter edition	Windows Operating System.

FSLogix	2.9.8884.27471	FSLogix is a set of containerization technologies from Microsoft that helps improve the performance and management of user profiles in virtualized desktop environments.
LoginVSI	4.1.40.1	Industry standard load-simulation testing tool for measuring the performance and scalability of centralized Windows desktop environments, such as VDI and hosted applications.

Table 4. Infrastructure VMs Configuration

Infrastructure VM Role	vCPU	RAM (GB)	Storage (GB)	OS
Active Directory	4	16	50	Windows Server 2016 64-bit
SQL Server (Events DB)	4	16	50	Windows Server 2022 64-bit
Horizon 8 Connection Servers 1 and 2	4	16	50	Windows Server 2022 64-bit
Login VSI Management Console	4	16	220	Windows Server 2016 64-bit
Login VSI Launcher	2	4	40	Windows 10 64-bit

Table 5. Virtual Machine Test Image Build (Golden Image)

Attribute	Login VSI Image
Desktop OS	Windows 11 Enterprise Version 21H1 64-bit
Hardware	VMware Virtual Hardware version 18
vCPU	2
Memory	4GB
Memory reserved	2.5GB
Video RAM	32MB
3D graphics	Disabled
NICs	1
Virtual network adapter 1	VMXNet3 Adapter
Virtual disk--VMDK1	64GB
SCSI controller	VMware Paravirtual
Applications	Microsoft Office 2021 Internet Edge Adobe Reader XI Adobe Flash Player 11 Doro PDF 1.82

VMware Tools	12352
VMware Horizon Agent	8.10.0-22012512 (2306)

Network Configuration

vSAN Express Storage Architecture typically requires a 25GbE network as minimum.

A VMware vSphere Distributed Switch (VDS) acts as a single virtual switch across all associated hosts in the desktop cluster.

Note the following settings for VMkernel ports and VM networks:

- vmk0-management
- vmk1-vMotion
- vmk2-vSAN
- vMotion-Active/Standby - MTU 9000
- vSAN-Standby/Active - MTU 9000
- Desktop VMs- Active/Active - MTU 9000

You may also refer to *Designing the vSAN Network* for more details.

Storage Configuration

Storage policy with erasure coding is the new default policy for workloads running on vSAN Express Storage Architecture. In this solution, we used "vSAN Express Storage Architecture default policy—RAID-6" as the storage policy for Horizon Desktop VMs deployed on vSAN Express Storage Architecture. The testbed is configured with 8 physical hosts and the Express Storage Architecture RAID-6 is the best storage policy that provides higher resiliency with FTT=2 for equivalent performance with no compromise as compared to RAID-1, and better space-efficiency (1.5x). For a smaller 4-node cluster, RAID-5 policy is the default storage policy.

FSLogix Cloud Cache with vSAN File Service

FSLogix Cloud Cache with vSAN File Service delivers resilient, high-performance profile management by combining active-active caching with scalable, enterprise-grade storage. This integration ensures seamless user experiences and simplified operations across modern VDI environments.**FSLogix with vSAN File Service is officially supported starting with vSphere 8.0 Update 3 Patch 05 (8.0.3P05) and VMware Cloud Foundation (VCF) 9.0.**

Configuring FSLogix with vSAN File Service involves a few steps that connect your virtual desktop infrastructure (VDI) to a centralized, high-performance storage solution.

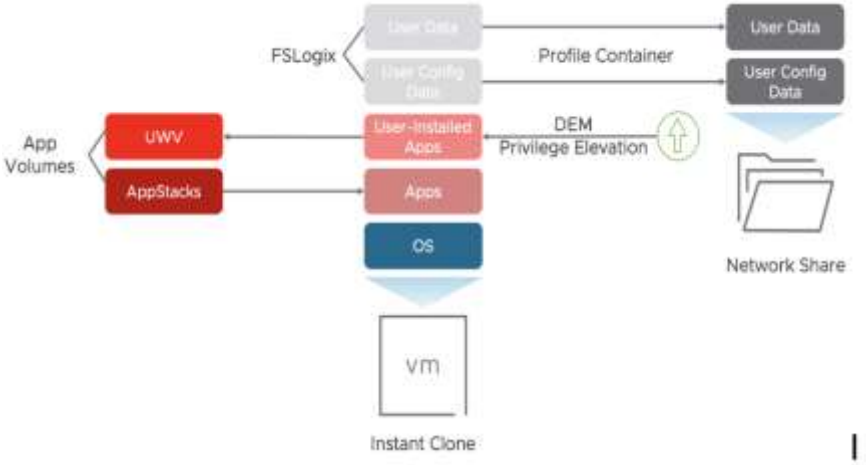

Figure 4. VDI Gold Image Architecture for Leveraging FSLogix with vSAN File Service

As Figure 4 shows , FSLogix Profile Containers work by storing local profiles, which include the entire user profile and cache data, in a VHD on the local VDI. Cloud Cache then uses the CCDLocations setting to point to multiple vSAN File Service Network shares, creating an "active-active" redundancy model. This setup ensures high availability and resilience by writing profile data to multiple locations simultaneously.

Prerequisites

Before you begin, ensure the following are in place:

- **vSAN File Service**: vSAN File Service must be enabled and configured on your vSAN cluster. This includes setting up the networking, DNS, and Active Directory integration for SMB file shares. The file service needs to be joined to your Active Directory domain to handle authentication and permissions.
- **FSLogix Installation**: The latest version of the FSLogix agent must be installed on your VDI golden image or individual VDI machines. You can get the installer from Microsoft's download center.
- **Active Directory**: You need a dedicated service account in Active Directory with permissions to create and delete computer objects. This account is used by the vSAN File Service to integrate with the domain.
- **File Share and Permissions**: A dedicated SMB file share on vSAN File Service is needed to store the FSLogix profile containers. You must configure both share-level and NTFS-level permissions correctly.

Create the FSLogix File Shares on vSAN File Service

1.Create one or more SMB shares. Each share will act as a Cloud Cache provider. (Create multiple shares for high availability)

Go to Configure > vSAN > File Shares.

Specify a name for the share (e.g.,Testshare-1, Testshare-2).

Select SMB as the protocol.

Set a storage quota if desired to manage the capacity consumed by user profiles.

2. Configure access control and permissions.

Share Permissions: Assign Full Control to the Administrators group and Change and Read permissions to the Authenticated Users group.

NTFS Permissions: This is where you grant granular access.

Add your VDI user group with Modify permissions for This folder only.

Add the CREATOR OWNER with Modify permissions for Subfolders and files only. This ensures that when a user's profile container is created, they have ownership and full control over their own VHDX file.

Add the Administrators group with Full Control.

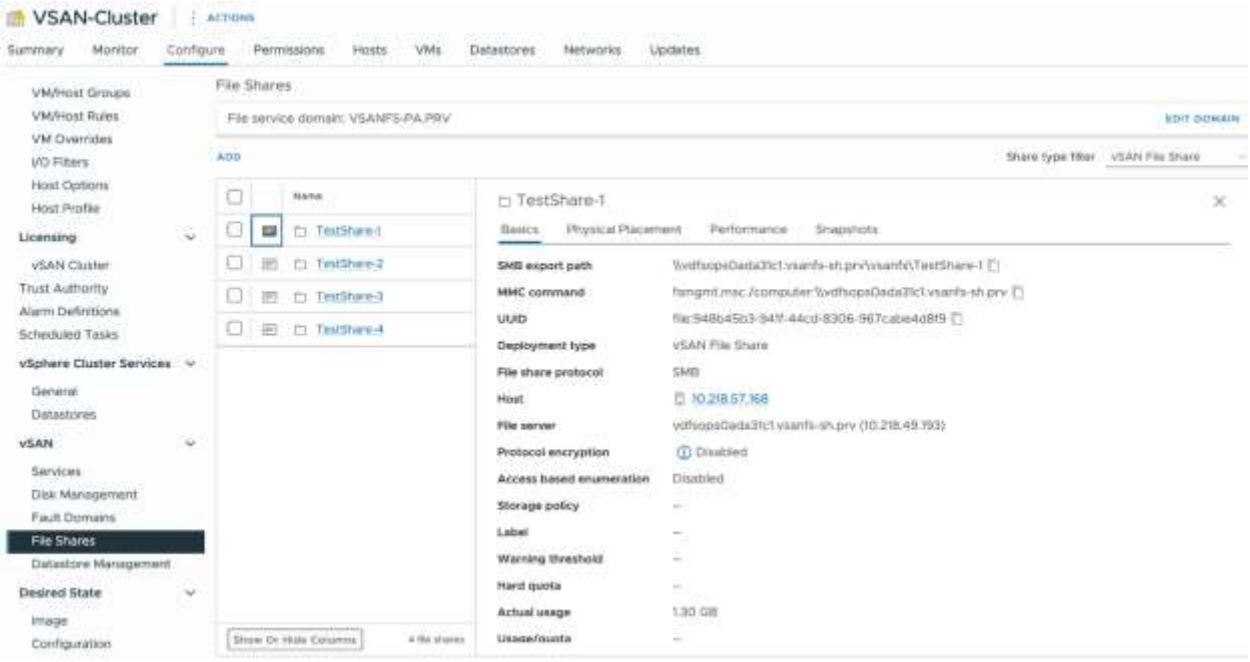

Figure 5. vSAN SMB File Share

Refer to https://learn.microsoft.com/en-us/fslogix/how-to-configure-storage-permissions for more information.

3. Configure FSLogix on the Golden Image

Log in to the VDI golden image with administrator privileges.

Open the Registry Editor by typing regedit in the Run dialog or search bar.

Navigate to the following registry path: HKEY_LOCAL_MACHINE\SOFTWARE\FSLogix\Profiles.

You will need to create or modify several values under this key:

Enabled: If this value doesn't exist, right-click in the right pane, select New > DWORD (32-bit) Value, and name it Enabled. Set its Value data to 1 to enable FSLogix Profile Containers.

CCDLocations: If this value doesn't exist, right-click, select New > Multi-String Value, and name it CCDLocations. Double-click it and enter the UNC path to your FSLogix profile share (e.g., \\<vSAN_File_Service_IP_or_FQDN>\FSLogixProfiles).

you will list one or more paths to the vSAN File Service SMB shares. This configuration allows FSLogix to write profile data to multiple locations simultaneously, providing high availability and data redundancy.

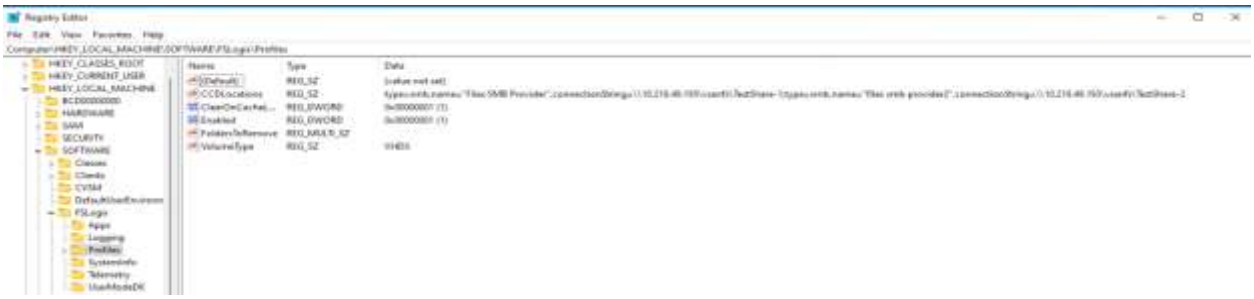

Figure 6. FSLogix Setting in Regedit

Verify the Configuration

Create a new VDI pool from the updated golden image and log into a new VDI machine with a standard user account.

Check Local Cache: Verify that a local VHD file is created in the default Cloud Cache location (C:\ProgramData\FSLogix\Cache\Profile). This confirms the local cache is active.

Open File Explorer and browse to the FSLogix file share on vSAN File Service to confirm that the user's profile is successfully redirected,You should see a new folder named after the user's SID, containing their profile VHDX file.

Horizon Configuration Settings

vCenter Server Settings

Horizon Connection Server uses vCenter Server to provision and manage Horizon desktops. vCenter Server is configured in Horizon Manager as shown in Table 7. We used the default value.

Table 4. Horizon Manager—vCenter Server Configuration

Attribute	Specification
Description	vCenter Server
SSL	On
Port	443
Advanced Settings: Max Concurrent vCenter Provisioning Operations Max Concurrent Power Operations Max concurrent maintenance operations Max Concurrent Instant Clone Engine Provisioning Operations	 24 50 12 12

Solution Validation

Test Tools

We used the following monitoring tools and benchmark tools in the solution testing.

Monitoring Tools

vSAN Performance Service

vSAN Performance Service is used to monitor the performance of the vSAN environment, using the vSphere web client. The performance service collects and analyzes performance statistics and displays the data in a graphical format. You can use the performance charts to manage your workload and determine the root cause of problems.

vSAN Health Check

vSAN Health Check delivers a simplified troubleshooting and monitoring experience of all things related to vSAN. Through the vSphere web client, it offers multiple health checks specifically for vSAN including cluster, hardware compatibility, data, limits, physical disks. It is used to check the vSAN health before the mixed-workload environment deployment.

LoginVSI benchmark Tool

Login VSI,*Login Enterprise* are used for simulating a typical user activity using the virtual desktop. Login VSI is 100% vendor independent and works with standardized user workloads. This standardization makes all conclusions based on Login VSI test data objective, verifiable, and repeatable.

Login VSI has several different workload templates depending on the type of user to be simulated. Each workload differs in application operations and the number of operations executed simultaneously. In the tests, the workload type is 'Knowledge Worker * 2vCPU'. The medium-level Knowledge Worker workload was selected because it provides the closest comparison to the average desktop user in our customer deployments.

Performance Benchmark Testing

We tested 1,600 sessions. It was 200 VM density per host, which is the max official support number.

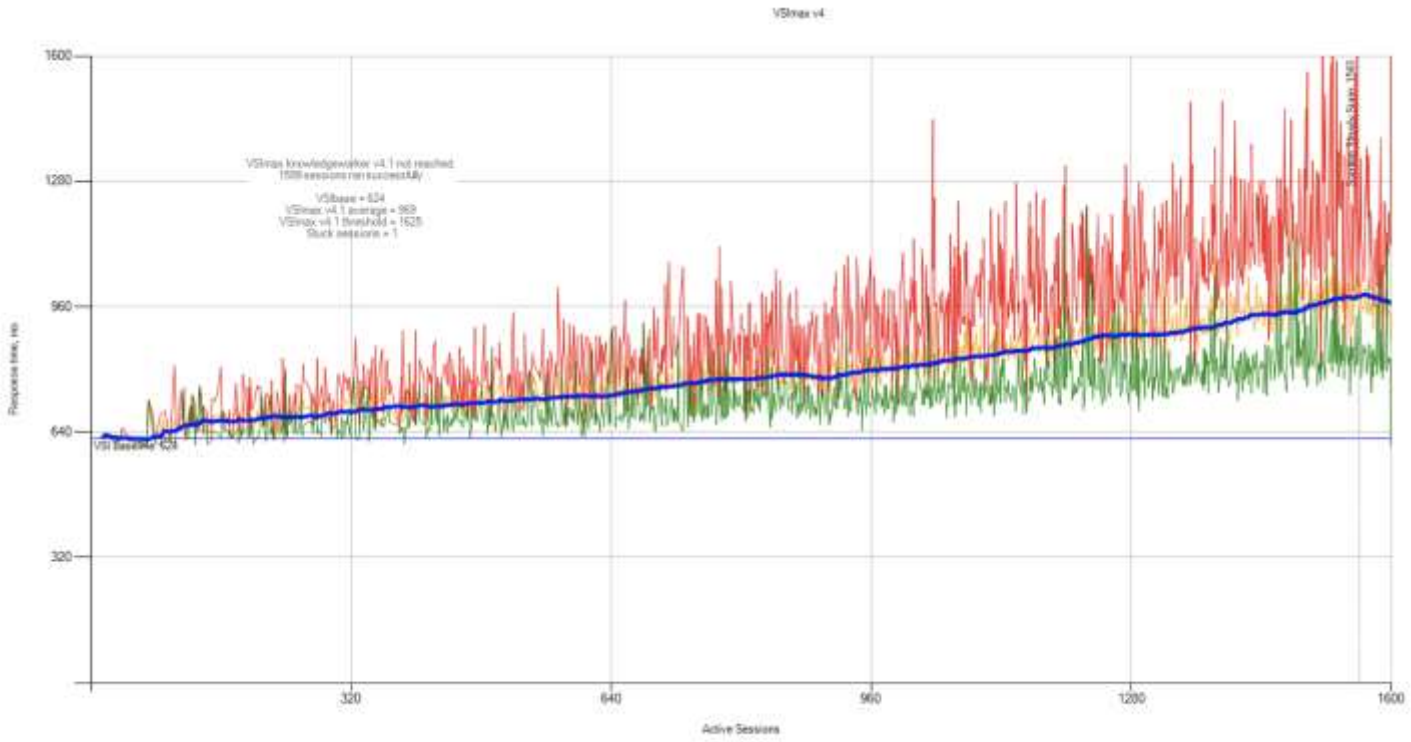

Figure 7. LoginVSI Benchmark Result

Figure 7 shows the 1,600 session Knowledge worker workload testing result. VSImax Knowledge Worker v4.1 was not reached with a Login VSI baseline performance score of 624. We ran 1,600 sessions in total and 1,599 knowledge worker sessions ran successfully. This was equal to 1,599 desktop users reading documents, sending emails, printing documents, and browsing the internet.

Figure 8 shows IOPS increased steadily because the number of active sessions increased. vSAN backend peak write IOPS was 4,670, the peak throughput was 134 MB/s and the peak latency was 0.278ms.

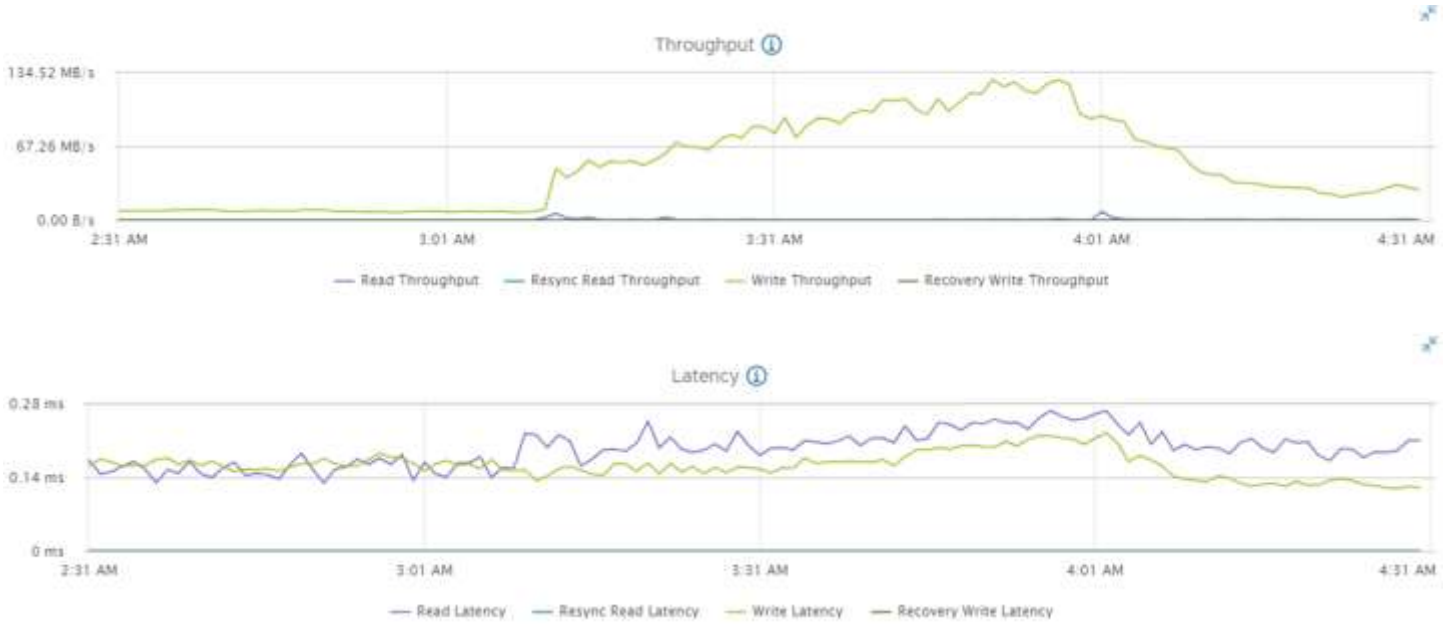

Figure 8. vSAN Backend Performance Results during LoginVSI Benchmark Testing

Memory Tiering Performance in VMware Cloud Foundation 9.0

In VDI environments, balancing cost with user experience is a major challenge. Provisioning each virtual desktop with enough memory to handle peak workloads is expensive and inefficient, as much of that memory sits inactive. However, traditional memory-saving techniques like ballooning, compression, or swapping often degrade performance, leading to a slow and unresponsive user experience.

Memory Tiering in VMware Cloud Foundation 9.0 is a hypervisor-level technology that transparently manages memory pages without needing a guest OS agent. It operates by continuously tracking the access frequency of memory pages to classify them as either "hot" (frequently accessed) or "cold" (infrequently accessed). This dynamic process places hot pages in Tier-1 (DRAM) for the lowest latency, while demoted cold pages are moved to a new high-performance Tier-2 on NVMe storage. This architectural approach effectively expands the host's memory capacity beyond physical DRAM, enabling higher VM consolidation ratios by disaggregating memory capacity from the expensive DRAM tier, all while delivering performance orders of magnitude faster than traditional swap devices.

This process is ideal for environments with high memory allocation but low active usage, a pattern common in VDI deployments like non-persistent or pooled desktops.By freeing up expensive DRAM, memory tiering significantly increases VM density, allowing more virtual desktops to run on a single physical server and lowering the overall cost-per-desktop. Unlike traditional swapping, this method is designed for minimal impact on performance, ensuring a responsive user experience by keeping all active data in the fastest memory tier.

We used the knowledge worker profile because it is the most widely used profile in industry benchmarking practices. The default DRAM:NVMe ratio is 1:1 for VCF 9.0. We used this default 1:1 ratio for all tests

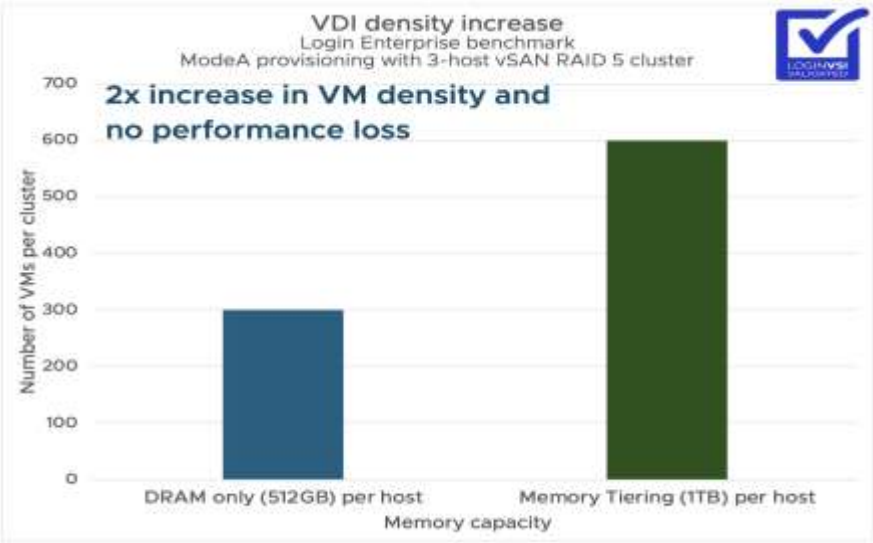

Figure 9 LoginEnterprise benchmark testing ModeA with 3-host vSAN cluster

LoginEnterprise benchmark testing confirms LoginVSI benchmark testing confirms the power of memory tiering.Figure 9 shows that in a 3-node vSAN cluster, memory tiering doubled the number of VDI sessions from 300 to 600 without any performance degradation. Other tests further validate this, showing we can double VM density with a negligible performance loss of just 0–8%.

Detailed reports of the VDI test performance including the use of Memory Tiering, are provided in Memory Tiering Performance in VMware Cloud Foundation 9.0 for details.

Operations Testing

Provisioning Instant Clone Desktops

In this test, a new pool of 1,600 instant clone virtual desktops was provisioned on the vSAN datastore, with 200 desktops per ESXi host. Run the following operations to complete the task:

- Create internal VMs like the internal template, replica VMs, and parent VMs, called the priming phase.
- Use VMware Instant Clone Technology to create desktops and prepare the operating system with the Clone Prep Feature.

The resource usage during 1,600 instant clones in the default Express Storage Architecture R6 configuration provisioning was lower than 50%, it took just 24 minutes (from 9:05PM to 9:29PM) for 1,600 desktops to become available.

Figure 10 shows the backend vSAN performance data. The peak IOPS was about 4,200, the peak throughput was 80MB/s and the peak latency was about 0.452ms.

Figure 10. vSAN Backend Performance Results during Provisioning Instant Clone Desktops

Pushing Image of Instant Clone Desktops

You can change the image of an instant clone desktop pool to push out changes or to revert it to a previous image. You can select any snapshot from any virtual machines to be the new image.

It took about 42 minutes to push a new image to the 1,600 instant clone pool in the default Express Storage Architecture R6 configuration.

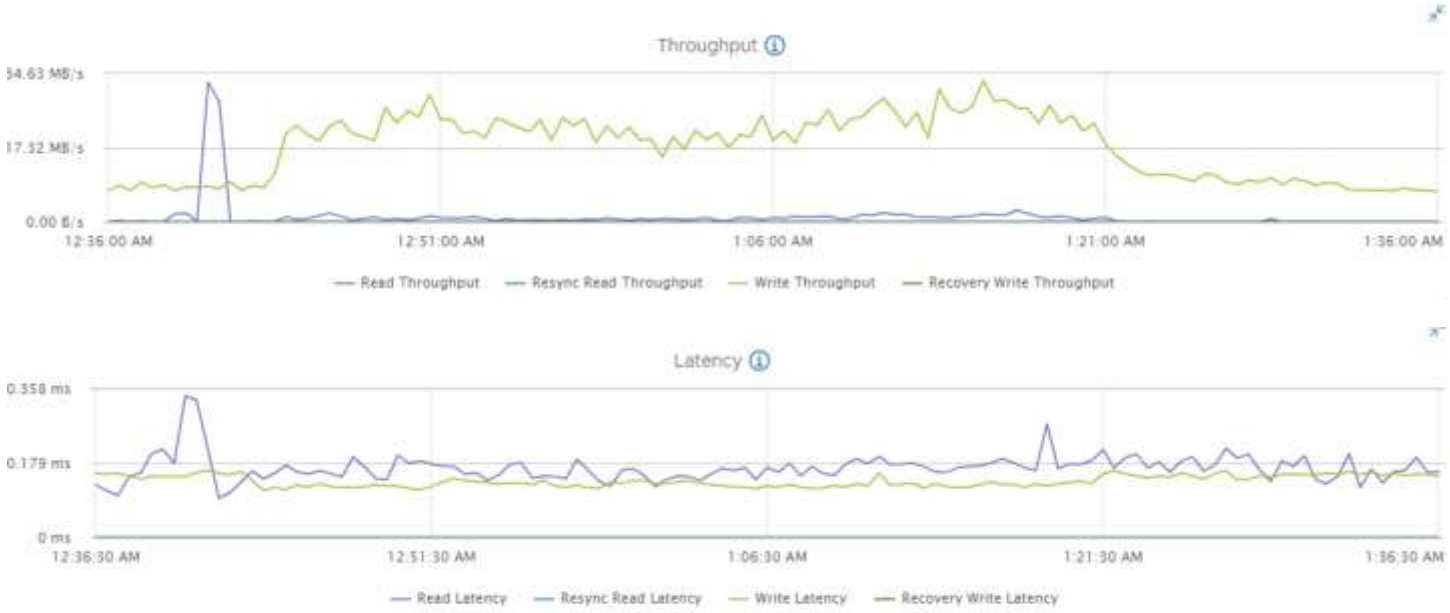

Figure 11. vSAN Backend Results during Pushing Image Operation

Figure 11 shows the backend vSAN performance data. The peak IOPS was about 3,100, the peak throughput was about 35MB/s and the peak latency was about 0.358ms.

Deleting Instant Clone Desktops

In this test, a pool of 1,600 instant clone virtual desktops was deleted. It took 28 minutes for the entire deletion process.

Best Practices

The following recommendations provide the best practices and sizing guidance to run Horizon on vSphere.

- Hardware consideration:
  - Follow *vSAN ESA ReadyNode Configurator* to make sure the hardware components meet the desired compatibility requirements.
  - Follow *ThinkAgile VX Series for VMware vSAN* for general hardware best practices.
  - For CPU type, using 8 4-core or 4 8-core CPUs is recommended for better utilization because they align well with common vCPU sizes like 1, 2, 4, and 8 vCPUs (the last with 2 virtual sockets and 4 cores per socket). In contrast, a CPU like four 7-core CPUs can only accommodate two vCPU sizes: 1 vCPU and 7 vCPUs.
- Compute consideration:
  - For VDI workloads to achieve optimal performance-to-cost ratio,enable memory tiering:
    - Memory tiering is ideal for non-persistent desktops, task workers, and pooled environments. In these setups, large amounts of memory are often allocated but only lightly used.By offloading "cold" or infrequently accessed memory pages to NVMe storage, you can significantly boost VM density and reduce overall costs. This approach has minimal impact on the user experience since active memory pages remain in faster RAM.

        - Ensure active memory remains at or below 50% of DRAM capacity. This allows vSphere to offload cold pages to NVMe without impacting latency-sensitive operations.
        - Maintain NVMe device read latency below 200 microseconds. Use vSphere performance charts or telemetry tools to validate device responsiveness.
        - Windows Image Optimization:
        - Disable unnecessary background services to reduce memory churn.
        - Use Sysprep and base image cleanup to minimize memory footprint.
        - Schedule signature updates for offline VDI pools to maintain security posture without bloating memory usage.
    - For VDI workloads to achieve better performance, in the BIOS settings, change Operating Mode for Maximum Performance to custom mode, Determinism = Performance NUMA = NPS4 and Efficiency Mode = Disabled, Change Processor SMT Mode = Enabled and Power Efficiency = Disabled
- Network consideration:
    - Use 25Gbps network as a minimum requirement for vSAN Express Storage Architecture. For better performance and throughput, consider a 40Gbps/100Gbps network.
- vSAN Express Storage Architecture Storage consideration:
    - Use erasure coding RAID-5/6 as the default storage policy for vSAN Express Storage Architecture as it eliminates the tradeoff of performance and deterministic space efficiency. Select FTT=1 using RAID-5 and FTT=2 using RAID-6 depending on the number of hosts presented in the Express Storage Architecture cluster and your data availability requirement.
- Horizon consideration:
    - If only instant clone desktop VMs are provisioned, vSphere HA can be disabled to provision more desktops as HA is unnecessary for instant clones.
    - The Horizon Concurrent Operations Limits for vCenter Server can be adjusted to speed up provisioning and maintenance operations if there is no bottleneck in DHCP requests or storage latency.

Conclusion

The combination of Horizon 8 with VMware Cloud Foundation (VCF) and its underlying vSAN Express Storage Architecture (ESA) delivers a highly optimized Virtual Desktop Infrastructure (VDI) solution. This architecture leverages innovative features like Memory Tiering to effectively double VM density, significantly reducing hardware costs without sacrificing performance.

For end-user experience, the integration of FSLogix Cloud Cache with vSAN File Service provides Always-On User Profile Resilience, eliminating the need for complex, external file servers and ensuring users maintain a seamless, uninterrupted experience even during component failures. Ultimately, this unified, fully optimized VDI environment strengthens security, enhances mobility, and boosts end-user productivity while dramatically reducing complexity and overall IT costs.

Reference

- VMware Cloud Foundation
- VMware vSphere
- VMware vSAN
- VMware Express Storage Architecture
- Omnissa Horizon

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