IMPACT OF EMC VNX AND FAST CACHE ON CITRIX XENDESKTOP PERFORMANCE
Deploy XenDesktop efficiently, powerfully

ESSENTIALS

Powerful
• Boot 1,000 Citrix XenDesktop machines in as little as eight minutes
• Patch 1,000 Citrix desktops in 10 minutes

Efficient
• Absorb up to 80 percent of IOPs with FAST Cache
• Support for all leading virtualization hypervisors (Citrix, Microsoft, VMware)

Savings
• FAST Suite reduces disks, power, space, and cooling costs
• FAST Suite lowers cost per IOP

Proven
• Accelerate deployment with validated reference architectures and proven solution guides
• Aligns server virtualization and end-user computing infrastructures

OVERVIEW
EMC’s holistic solution approach to desktop virtualization supports users at scale, including capacity, number of users, number of devices, and performance, and leverages Flash drive technology. The examples in this overview represent performance tests in a 1,000-user Citrix XenDesktop environment with XenDesktop running on XenServer hypervisor. The results of the EMC® VNX®, Citrix XenDesktop/XenServer, and EMC FAST Suite with Flash drive technology combination demonstrate how EMC VNX is the storage platform for desktop virtualization, and the impact of FAST Cache performance proves that there are real opex savings.

EMC UNIFIED STORAGE
The EMC VNX Series is built for speed and delivers robust performance and efficiency to support the provisioning and protection of all types of virtual desktops (thin/thick). The VNX Series is optimized for virtualization, supporting all leading hypervisors (VMware®, Microsoft, and Citrix), simplifying desktop creation and storage configuration using a single management framework for NAS, SAN, and replication. The VNX also supports Flash drives that combine with the EMC FAST Suite making it ideally optimized for delivering outstanding performance and user experience. Trusted by worldwide organizations, Citrix runs its executive desktop environment as well as its briefing center on VNX storage.

EMC FAST CACHE
In the course of normal operations, a virtual desktop infrastructure will go through boot storms and log-in storms which cause peaks in read I/Os. Virus scanning, OS upgrades, and software patching also trigger these same I/O spikes placing a lot of stress on the storage infrastructure. EMC’s FAST Suite enables VNX to leverage Flash drive technology to mitigate these performance issues and maximize storage efficiency by absorbing the I/O “storms.” The FAST Suite consists of FAST Cache and FAST Virtual Pool (VP). FAST Cache is an extension of DRAM cache and copies the hottest data to Flash drives. It delivers a realtime performance boost by ensuring that the hottest data is served from the highest-performing Flash drives for as long as needed. With FAST Cache, disk access is avoided when the data resides in the SSD cache, which dramatically improves I/O times and total performance. FAST Cache optimizes Flash utilization to reduce spindle count resulting in reduced block and file storage costs and cost per IOP.

IMPACT OF VNX AND FAST CACHE
EMC Solutions Group performed boot-storm testing along with workload and patch testing with EMC VNX and FAST Cache on 1,000 Citrix XenDesktops demonstrating how VNX minimizes the use of Flash drives to save money, floor space, cooling, and all the other costs of associated with large arrays. The test results are as follows:
**TEST: BOOT STORM**

In this test (Figure 1), a boot storm generated almost 14,000 IOPS at peak load with almost 80 percent of this I/O absorbed by EMC FAST Cache. Only two 200 GB SSDs in this solution indicate the ability of SSDs used as Cache to absorb extreme I/O loads. Without FAST Cache, this test would have needed over 100 SAS drives to deliver the same performance.

![Figure 1](image1)

**SINGLE-DISK IOPS**

Figure 2 shows the performance characteristics of a single disk during the same test. The peak I/O was about 127 IOPs, which is substantially lower than the 180 IOP load typically supported by a single SAS drive. The graph demonstrates that with FAST Cache, the load on the spinning disks is well within tolerances, and there is even ample room for expansion.

![Figure 2](image2)

**TEST: USER WORKLOAD TESTING**

Figure 3 shows the average response time as observed by a user working in this environment. This test is intended to be a measurement of the users’ experience, and at the end of the day, if the user is not satisfied with the response time, then the desktop virtualization project will not be successful. This point alone makes these test results very important. The test used a tool called LoginVSI to simulate 1,000 task workers running a mix of Microsoft applications, Adobe, Exchange, and some videos. The average response time in the test was less than four seconds—in the worst case. This type of performance result is on par with a traditional desktop environment.

![Figure 3](image3)
TEST: PATCH MANAGEMENT

In addition to the daily boot storms (high I/O activity), EMC solution testing also considers provisioning and patch management activities. This patch installation test (Figure 4) pushed a security update using Microsoft SCCM across the same 1,000 user configuration. It is another example of how EMC FAST Cache improves performance. The patch operation took about 10 minutes for 1,000 Citrix desktops. This operation generated a short, intense I/O load peaking at 16K IOPS. Again, the full EMC solution used just two SSDs in this operation, indicating the ability of SSDs used as Cache to absorb extreme desktop virtualization I/O loads.

PROVEN SOLUTIONS FOR CITRIX XENDESKTOP

EMC architects desktop virtualization solutions for I/O optimization in persistent and non-persistent environments for Citrix XenDesktop to document how EMC unified storage, through best practices, reduces cost per GB and cost per IOP, which helps IT managers and decision makers mitigate the cost challenges of desktop virtualization deployment. EMC solutions for Citrix XenDesktop include a complement of reference architectures and proven solution guides that accelerate deployment. For more information about EMC desktop virtualization Proven™ Solutions with VNX unified storage and FAST Cache, please visit www.EMC.com.

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To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, contact your local representative or authorized reseller—or visit us at www.EMC.com.