AMD EPYC™ with Nutanix™ and HPE Proliant™ DX385 Gen10 Plus Server: Higher Density and Performance for Virtual Desktop Infrastructure

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VDI Performance Leadership with AMD EPYC processors, Nutanix and HPE

Nutanix-integrated HPE ProLiant DX appliances, the result of a collaboration between two industry leaders, help customers simplify and modernize their datacenters to run applications at scale.

High Performance at High Density

AMD testing demonstrates excellent response time at full load providing a productive and comfortable user experience. See Figure 3 and Figure 4.

More Desktops, Same Footprint

AMD internal Login VSI testing demonstrates that AMD EPYC 7F52 processor-based systems with fewer cores beat Intel Xeon 5220-based systems. Dramatically increase the number of virtual desktops you can run in the same datacenter footprint when using the 24-core AMD EPYC 7F72 processor.

Higher Performance Changes the Economics of the Datacenter

Performance demands are increasing; IT budgets and datacenter space are not. Built on 7nm technology, AMD EPYC™ 7002 Series processors pack more cores and more power into the same space as the previous generation.

AMD EPYC™ Processors with Nutanix™ Deliver Exceptional VDI Performance on Login VSI™

You can help reduce TCO now with servers powered by AMD EPYC™ processors. With their high core count, high clock speed, and high memory bandwidth, AMD EPYC processor-based servers prove to be an excellent choice for deploying virtual desktops in a hyperconverged environment. Figure 1 shows how you can achieve high performance with fewer cores using the AMD EPYC 7F52 processor compared to Intel Xeon 5220, and dramatic performance improvements without increasing data center space using the AMD EPYC 7F72 processor.
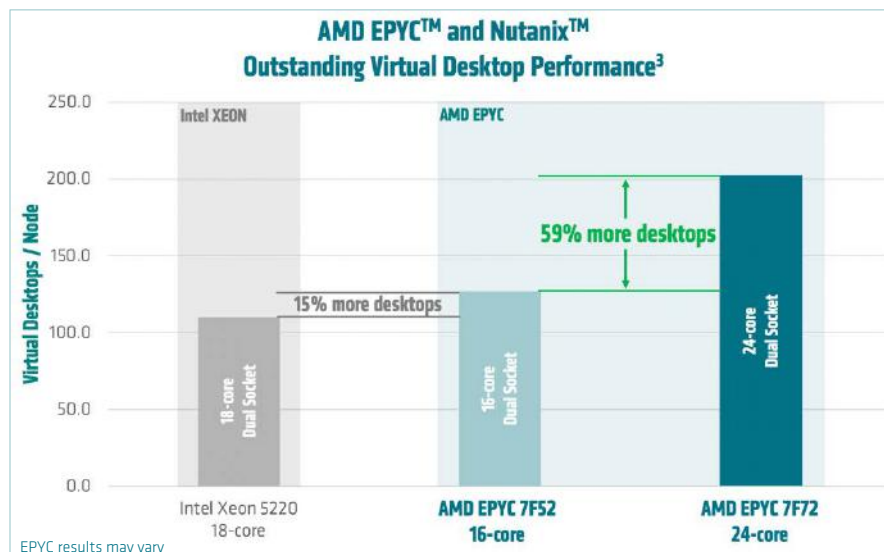

Figure 1: AMD EPYC Performance on LoginVSI "knowledgeworker" test on Windows® 10

Table 1 summarizes these Login VSI performance results on a 4-node HPE ProLiant DX385 Gen10 Plus server with both 16-core AMD EPYC 7F52 processors and 24-core AMD EPYC 7F72 processors.

Tested with Login VSI

Login VSI is the industry standard virtual desktop load-testing tool. With the Login VSI benchmark you can model the performance, scalability and availability of typical virtual desktop environments based on their synthetic user technology. Login VSI uses Microsoft® Office and other knowledge worker applications to determine response times.

AMD

Nutanix Acropolis™ Software

Nutanix Acropolis™ software converges compute and storage to provide cloud-like infrastructure that can run applications at scale. Nutanix Hyperconverged Infrastructure software tightly integrates storage, networking, and compute resources into a powerful software-defined virtualized single-managed pool. Integrating storage, networking, and compute resources into a single infrastructure building block avoids having to manually stitch together separate discrete computing devices. Nutanix software enables VDI applications and delivers excellent user performance and scalability without burdensome operational and capital requirements.

AMD and Nutanix worked together on optimizing the Nutanix hyperconverged software, Acropolis OS, on AMD EPYC processors. Together, AMD and Nutanix have enabled choice in hypervisors including Nutanix Acropolis Hypervisor (AHV), VMware ESXi™, and Microsoft Hyper-V®.

Test Configurations

AMD engineers configured four dual-socket servers with 16-core AMD EPYC 7F52 processors and 24-core AMD EPYC 7F72 processors and 1 TB of memory. The hybrid storage configuration used with Nutanix software was 2x 1.92 TB SSDs and 10x 1.92 TB HDDs in each server for a total of 38.83 TB of usable storage. Nutanix deduplication and erasure coding were disabled, and compression was enabled. 25-Gbps switches connected the servers. See Figure 2.

The virtual desktops ran Microsoft Windows® 10 Enterprise 64-bit with 2 vCPUs each, 4GB of memory allocated and 50 GB of vDisk. The benchmark configuration was compared to a similarly configured Nutanix architecture reference system[3] designed to support virtual desktops. See Table 2 for configuration details.

Figure 2: Benchmark Configuration

Test Methodology

Login VSI Pro connects to remote desktops and simulates an end user performing typical office tasks. Different profiles are available for testing. This test used the Knowledge Worker profile, meant to simulate CPU, Memory and IO usage that is representative of a typical data entry worker. This test used VMware Horizon® via Launcher VMs to connect using the VMware Blast Protocol with 100 Launcher VMs serving a maximum of 25 connections each, and resolution levels set to a maximum of 1024 x 768 on all configurations. Login VSI Pro version 4.1.40.1 was used with benchmark mode enabled, the Knowledge Worker profile selected for all tests. See Tables 3 and 4 for BIOS and other virtualization settings.
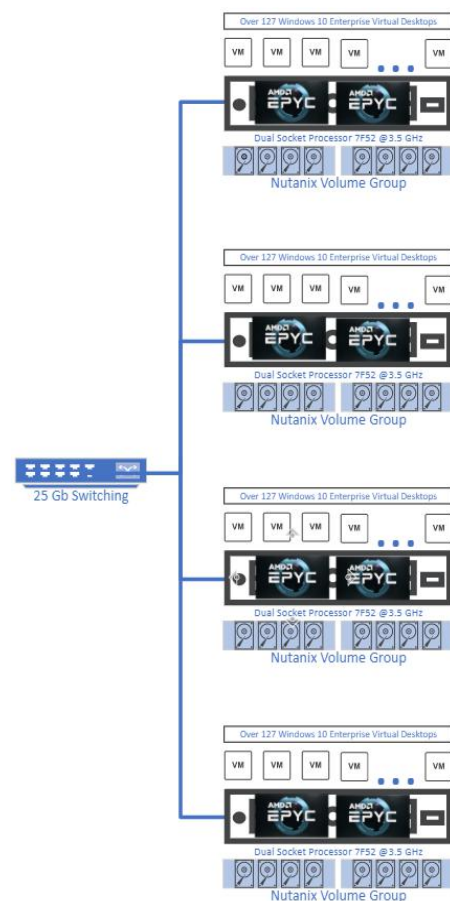
Processor	Desktop Operating System	Virtual Desktops Per Node
2 x AMD EPYC 7F72, 24 core, 3.2 GHz	Windows® 10 Enterprise 64-bit build (1909), MS Office 2016	**~202**
2 x AMD EPYC 7F52, 16 core, 3.5 GHz	Windows® 10 Enterprise 64-bit build (1909), MS Office 2016	**~127**
2 x Intel Xeon 5220 18-core, 2.2GHz[3]	Windows® 10 Enterprise 64-bit build (1909), MS Office 2016	~110

Table 1: Login VSI Test of Windows 10 Desktops (knowledge worker)

	AMD EPYC Configuration	Reference System[3]
Server	4x Dual-socket Server (HPE ProLiant DX 385 Gen10+)	8x Dual-socket Intel-based server
CPU	2x AMD EPYC 7F52 16 Core @ 3.5 GHz, and 2x AMD EPYC 7F72 24 Core @ 3.7 GHz	2x Intel® Xeon® Gold 5220 18 Core @ 2.2 GHz
RAM	1 TB per server	768 GB per server
Network adapter	HPE Eth 10/25Gb 2p 640FLR-SFP28 Adapter	2x 10 GbE
Disks	2x 1.92 TB SSD, 10x 1.92 TB HDD	2x 1.92 TB SSD, 4x 2 TB HDD
Hypervisor	VMware ESXi™ 6.7 U3	VMware ESXi 6.7 U3
Nutanix AOS	5.17.1	5.15
VMware Horizon	7.11	7.12

Table 2: Benchmark and Reference Configuration Details

Settings	Default Value	Set Value
HPE Workload Profile	Custom- General Power Efficient	Virtualization Max Performance
xGMI Max Link Width	Auto	X16
xGMI Force Link Width	Auto	X16
NUMA Memory Domain Per Socket	NPS2	NPS1

Table 3: Server BIOS Settings

Settings	Default Value	Set Value
Numa.PreferHT	0	1
Power.CpuPolicy	Balanced	High Performance

Table 4: Virtualization Advanced Settings

LoginVSI Test Results

The LoginVSI test results are shown in Figures 3 and 4. Figure 3 shows that the dual-socket, 16-core AMD EPYC 7F52 processor-based four node cluster supports up to 508 virtual desktops. Thus, each server delivers ~127 virtual desktops.
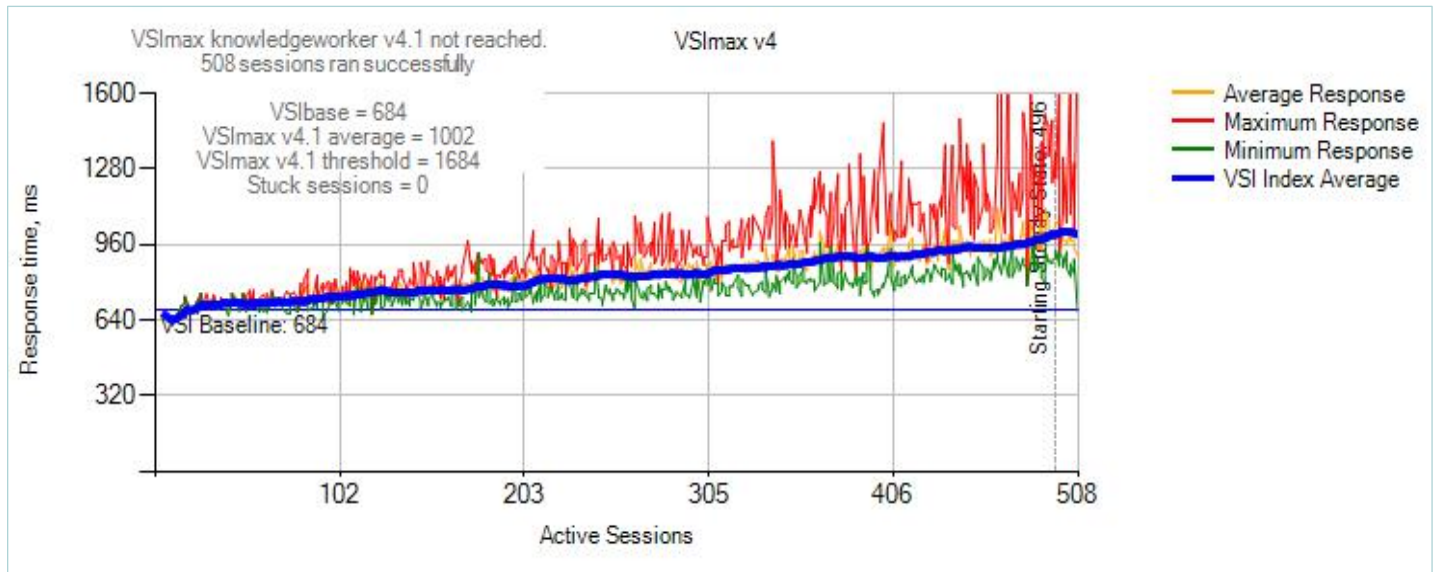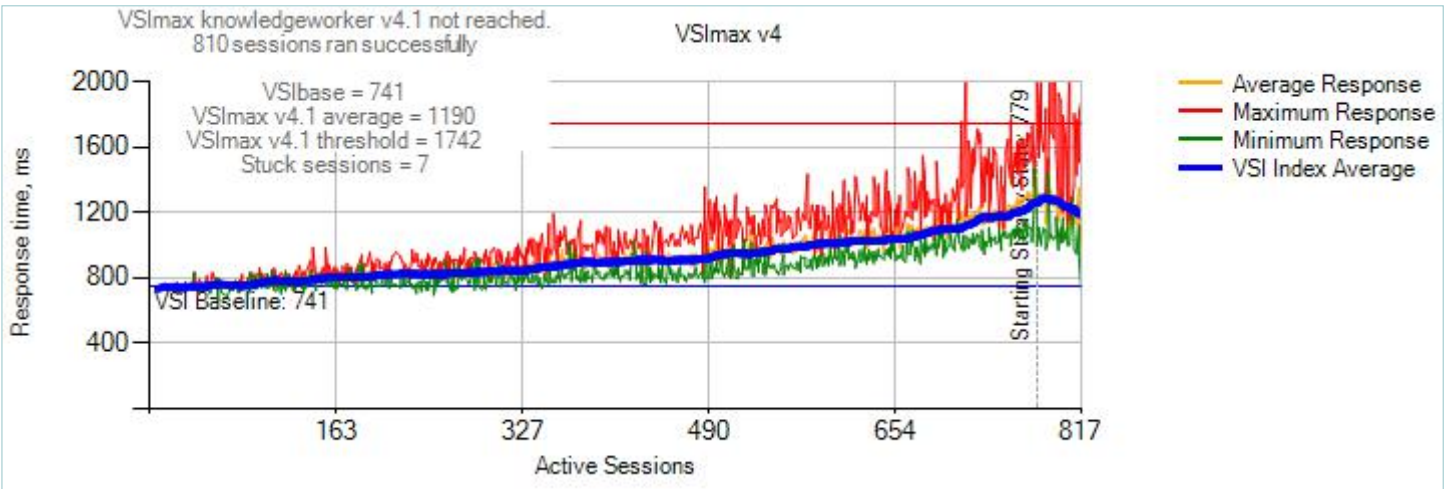

Figure 3 AMD EPYC 7F52 Server Login VSI Test Results (knowledgeworker)

The baseline score for the Login VSI test was 684. This score falls in the 0 through 799 range rated as "Very Good" by the Login VSI tool[1,2]. The Login VSI test was run for 508 user sessions for the Knowledge Worker workload. The blue line in the Figure 3 indicates that the system reached a VSImax average score of 1002 when 508 sessions were loaded. This is well below the VSI threshold level of 1684 set by the Login VSI tool.

Figure 4 shows that the dual-socket, 24-core AMD EPYC 7F72 processor-based four node cluster supports up to 508 virtual desktops. Thus, each server delivers ~127 virtual desktops.

Figure 4: AMD EPYC 7F72 Server Login VSI Test Results (knowledgeworker)

The baseline score for the Login VSI test was 741. This score falls in the 0 through 799 range rated as "Very Good" by the Login VSI tool[1,2]. The Login VSI test was run for 810 user sessions for the Knowledge Worker workload. The blue line in the Figure 4 indicates that the system reached a VSImax average score of 1190 when 810 sessions were loaded. This is well below the VSI threshold level of 1742 set by the Login VSI tool.

Conclusion

2nd Gen AMD EPYC 7F52 processors with 16 cores each can deliver excellent VDI performance with the capability to support up to 508 desktops on a dual-socket, 4-node cluster. On a per node basis, Login VSI performance on dual socket 16-core EPYC 7F52 processors is ~127 desktops, much higher than the ~110 desktops per node on a dual socket, 18-core Intel Xeon Gold 5520 processor-based cluster. For even higher performance, EPYC 7F72 processors with 24 cores each can achieve up to 810 desktops in a dual-socket, 4-node cluster or ~202 desktops per node. Depending upon the number of virtual desktops needed, customers have the ability to pick from the above EPYC processor choices or from the wide variety of EPYC processors supported on the HPE Proliant DX385 Gen10 Plus server.

The AMD EPYC processor is ideally suited for hyperconverged infrastructure (HCI) providing high performance for virtualized enterprise workloads that are typical in private cloud deployments. With high core counts per socket coupled with an impressive number of I/O channels for native connectivity, AMD EPYC System-on-Chip (SoC) performance scales well across cores helping minimize application performance variation. The ability to package more cores in a comprehensive system on chip is essential to delivering superior performance at a reasonable cost. It is part of AMD's strategy of delivering a better balance of resources for optimized real-world application performance. 2nd Gen AMD EPYC delivers best-in class[4] number of cores, memory capacity and bandwidth, and massive I/O capacity - all essential elements of virtual desktop environments.

Related Links

- AMD EPYC Server Processors for Hyperconverged Infrastructure *
- AMD Data Center Solutions
- AMD EPYC™ Tech Docs and White Papers Library

FOOTNOTES

1. Login VSI rating summary link
   https://www.loginvsi.com/documentation/index.php?title=Login_VSI_Analyzing_Results#Summary *
2. Knowledge worker testing information can be found at:
   https://www.loginvsi.com/documentation/index.php?title=Login_VSI_Workloads#Knowledge_Worker *
3. Nutanix VMware Horizon Reference Architecture for VDI. Section 9, Test Results: Figures 18, 19, 20 & 21
   https://download.nutanix.com/solutionsDocs/RA-2058-VMware-Horizon.pdf *
4. Best-in-class based on industry-standard pin-based (LGA) X86 processors. EPYC-08