HPE Proliant DX385 Gen11 System Integrated with NUTANIX™ Software DELIVER SUPERB VDI PERFORMANCE SCALABILITY AND FLEXIBILITY

Powered by 4th Gen AMD EPYC™ Processors

January, 2025

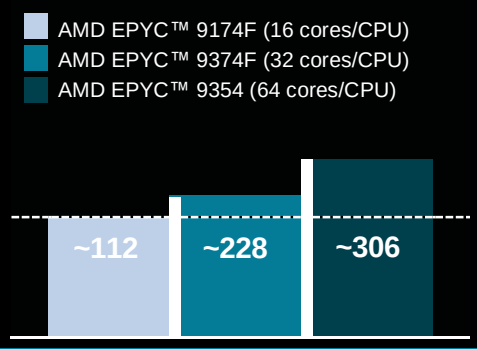
AT A GLANCE

4-node HPE DX385 Gen 11 with Nutanix™ clusters powered by general purpose and high-frequency 4th Gen AMD EPYC processors deliver excellent performance and scalability for Virtual Desktop Infrastructure (VDI) deployments.

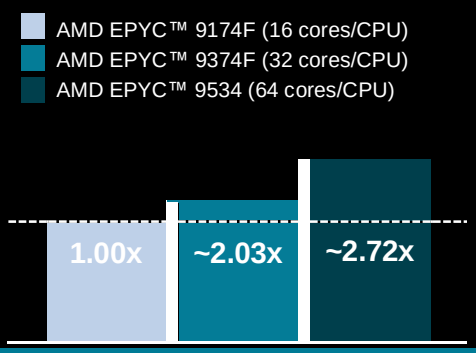
PERFORMANCE HIGHLIGHTS

Four-node HPE DX385 Gen 11 with Nutanix cluster powered by selected 4th Gen AMD EPYC general purpose and high-frequency processors show strong virtual desktop scaling performance as the number of cores per processor increases from 16 to 32 and then 64.

MEDIAN NUMBER OF VIRTUAL DESKTOPS PER NODE



RELATIVE NUMBER OF VIRTUAL DESKTOPS PER FOUR-NODE CLUSTER



KEY TAKEAWAYS

Enterprises are increasingly turning to VDI to support today's more remote and flexible workforce in order to optimize costs (such as by allowing employees to access virtual desktops using their personal devices) and enhance security by keeping sensitive data in the data center. HPE Proliant DX 385 Gen 11 powered by 4th Gen AMD EPYC™ processors and integrated with Nutanix software are ideal for VDI deployments and show excellent scalability as the number of processor cores increases.

General purpose and high-frequency 4th Gen AMD EPYC 9004 processors are available in 1P and 2P configurations and feature:

- Up to 96 cores (192 threads) per processor.
- Up to 384MB L3 cache.
- Up to 4 links of Gen 3 Infinity Fabric™ at up to 32 Gbps.
- 12 memory channels that support up to 6TB of DDR5-4800 memory.
- Support for PCIe® Gen 5 at up to 32 Gbps.
- AVX-512 instruction support for enhanced HPC and ML performance.
- AMD Infinity Guard technology to defend your data.[2]

IN THIS BRIEF

INTRODUCTION

The ongoing trend toward remote work has companies scrambling to support a growing number of employees needing access to corporate applications and data from any location, on any device, at any time. Many of these companies are implementing on- premises Virtual Desktop Infrastructure (VDI) to meet this pressing need while simultaneously addressing the equally pressing needs for data sovereignty, privacy, performance, and security. IT departments are also looking for ways to streamline datacenter operations, increase scalability, and reduce costs. Hyperconverged Infrastructure (HCI) is increasingly becoming the infrastructure of choice to achieve these objectives. Enterprises implement HCI technologies in their IT ecosystem to deploy and manage IT resources and software to help improve TCO in a scalable business environment. Nutanix is a HCI software leader that has AMD EPYC 9004 based HCI appliances (HPE DX 385 Gen 11) that can simplify and modernize datacenters to run applications at scale.

HCI is the platform of choice for VDI implementation because this model collocates compute, storage, and network virtualization onto a single node instead of across several pieces of siloed hardware. HCI facilitates sharing system resources among applications, thereby optimizing the cost per Virtual Machine (VM) for VDI deployments while delivering exceptional performance and ease-of-use.

Dual-socket HPE DX 385 Gen 11 servers powered by 4th Gen AMD EPYC processors are a validated* solution that deliver the high performance needed to support a large number of simultaneous virtual users across a wide range of business sizes and workload requirements while offering the following key benefits to customers:

- Performance: AMD EPYC processors offer high base and max boost[1] frequencies that optimize per-core performance and license costs.
- Cost-effective: Support large numbers of virtual desktops per server.
- Scalability: Scale up by increasing the resources in the same server to host additional virtual desktop users or scale out by adding nodes as you grow.
- High Availability: Nutanix includes powerful self-healing, data protection, and disaster recovery capabilities to keep databases and applications running and your critical data well protected.
- Flexibility: Customize virtual desktops based on your requirements, such as persistency and the resources/application available to each virtual desktop.

Figure 1 shows the topology used for the VDI tests described in this white paper.

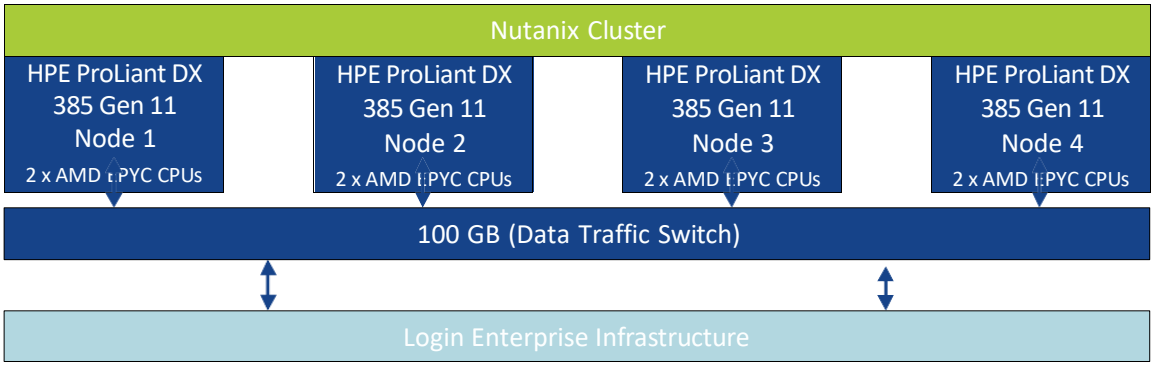


Figure 1: Topology used for VDI testing

NUTANIX PRISM SOFTWARE

Nutanix Prism™ is an end-to-end consumer-grade management solution for virtualized datacenter environments that combines several aspects of administration and reporting to offer unprecedented simplicity. It provides an intuitive user interface to simplify and streamline routine datacenter workflows, eliminating the need to have disparate management solutions for different tasks.

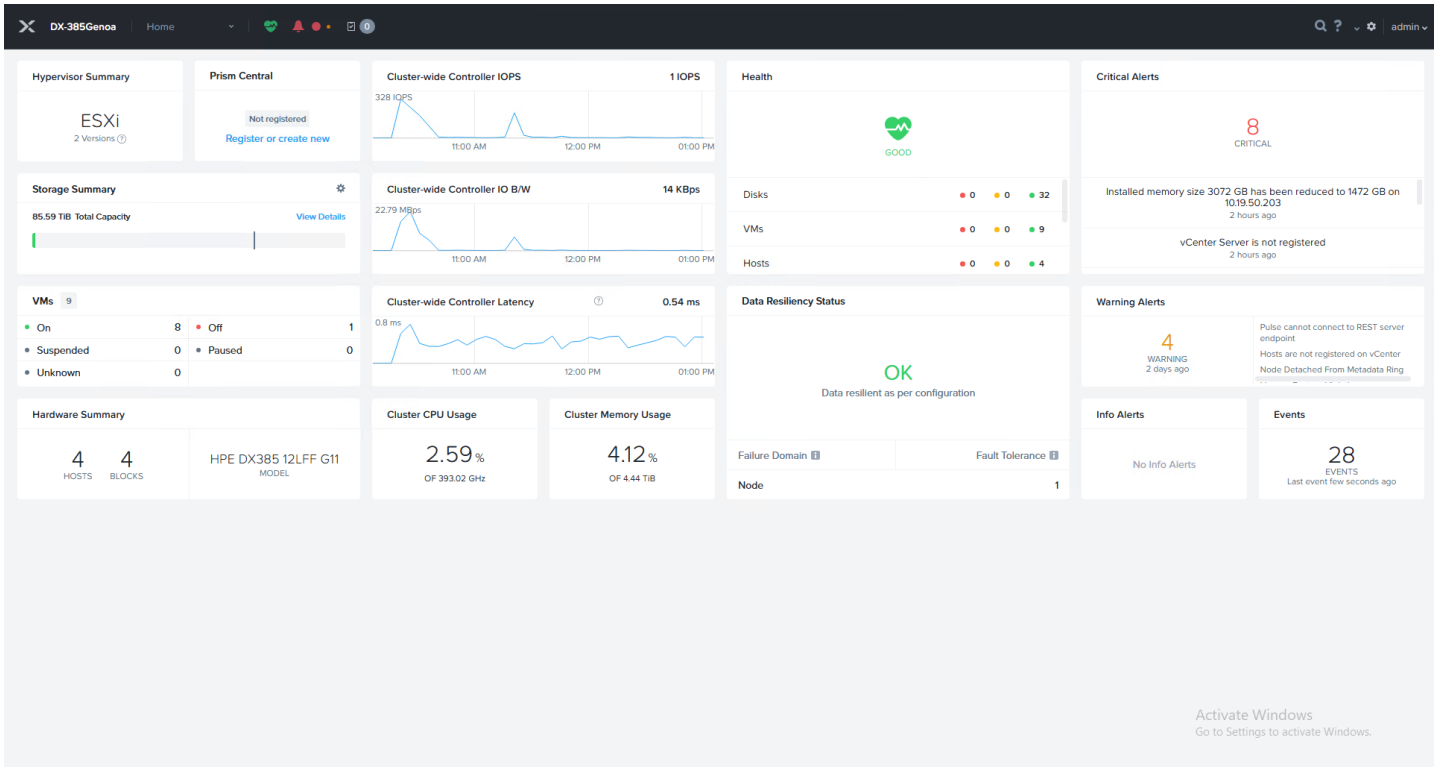


Figure 2: Sample Nutanix Prism Hypervisor Summary view

DETAILED RESULTS

This section provides detailed results of the VDI testing used for this performance brief. Login Enterprise* replaces the former Login VSI™ benchmark and uses workloads that are designed to simulate real-world usage scenarios. The Login Enterprise benchmarking tool was used to measure VDI performance using the Knowledge Worker user profile that uses standard office applications, such as Microsoft Office and common web browsers. Login Enterprise gathers several metrics:

- VSI Max, which measures virtual desktop density, or how many simultaneous virtual desktops each server can support.
- EUX, which measures application response times.
- Times taken for users to log in, open applications, and close applications.

These tests captured the maximum number of virtual desktops each server can support with “Good” EUX scores of 6.5 to 6.8 and 5.5 -6.5 with “Fair” out of 10. Your production needs may vary. Please contact your Nutanix representative for detailed server and cluster recommendations.

16-CORE PROCESSORS

The four-node cluster powered by high-frequency 16-core AMD EPYC 9174F processors supported up to a median of ~448 simultaneous virtual desktops, which is a median ~112 simultaneous virtual desktops per server at a median "Good" EUX score of 6.7 out of 10. The blue line in Figure 2 shows the EUX score impact of adding virtual desktops. This line drops as one approaches and surpasses VSI Max because of the corresponding increases in application response times shown in Figure 3 because of resource contention.

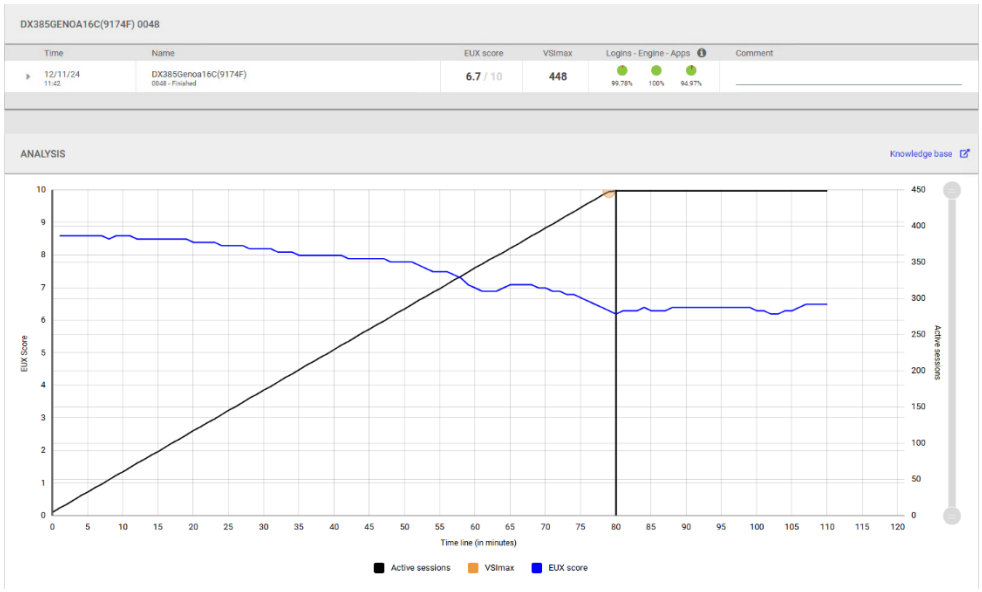


Figure 3: Median Login Enterprise EUX score with increasing virtual desktop density (four 2P 16-core AMD EPYC 9174F nodes)

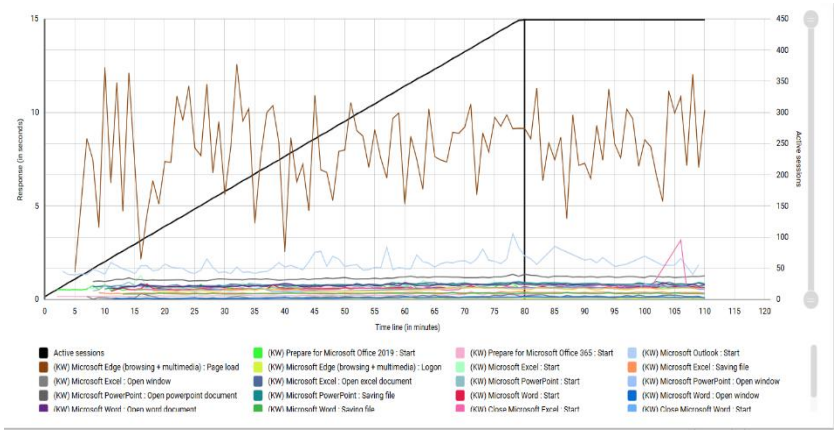


Figure 4: Median Login Enterprise application response times with increasing virtual desktop density (four 2P 16-core AMD EPYC 9174F nodes)

32-CORE PROCESSORS

The four-node cluster powered by high-frequency 32-core AMD EPYC 9374F processors supported up to a median of ~910 simultaneous virtual desktops, which is a median ~228 simultaneous virtual desktops per server at a median "Fair" EUX score of 6.4 out of 10. The blue line in Figure 4 shows the EUX score impact of adding virtual desktops. This line drops as one approaches and surpasses VSI Max because of the corresponding increases in application response times shown in Figure 5 because of resource contention.

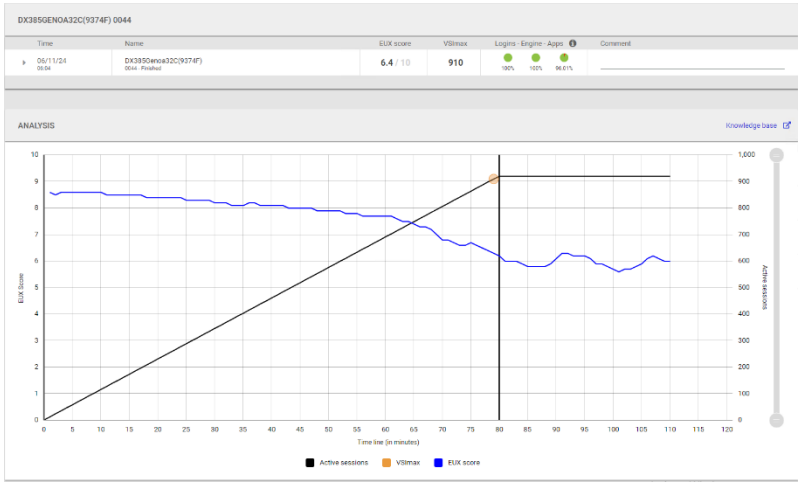


Figure 5: Median Login Enterprise EUX score with increasing virtual desktop density (four 2P 32-core AMD EPYC 9374F nodes)

Figure 6: Median Login Enterprise application response times with increasing virtual desktop density (four 2P 32-core AMD EPYC 9374F nodes)

64-CORE PROCESSORS

The four-node cluster powered by general purpose 64-core AMD EPYC 9554 processors supported up to a median of ~1,223 simultaneous virtual desktops, which is a median of ~306 simultaneous virtual desktops per server at a median "Fair" EUX score of 6.2 out of 10. The blue line in Figure 6 shows the EUX score impact of adding virtual desktops. This line drops as one approaches and surpasses VSI Max because of the corresponding increases in application response times shown in Figure 7 because of resource contention. General purpose processors with high core counts offer high flexibility to customers running a wide variety of workloads on the same servers.

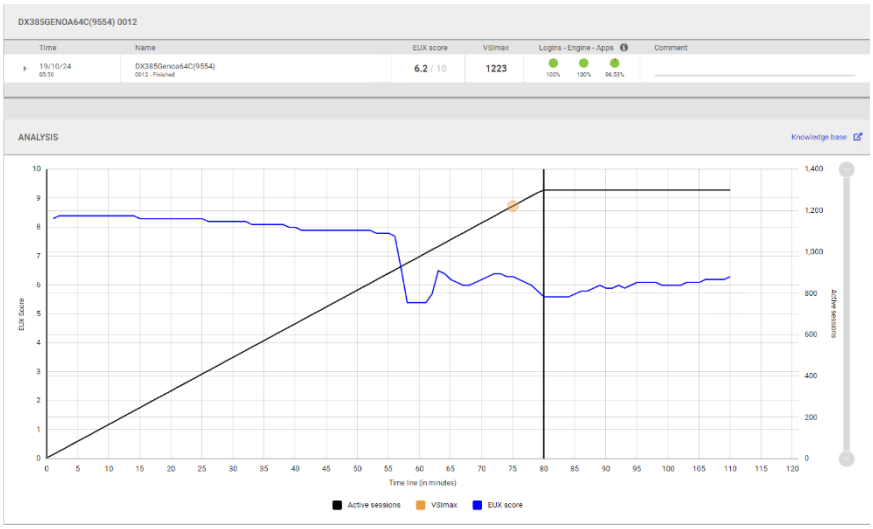


Figure 7: Median Login Enterprise EUX score with increasing virtual desktop density (four 2P 64-core AMD EPYC 9554 nodes)

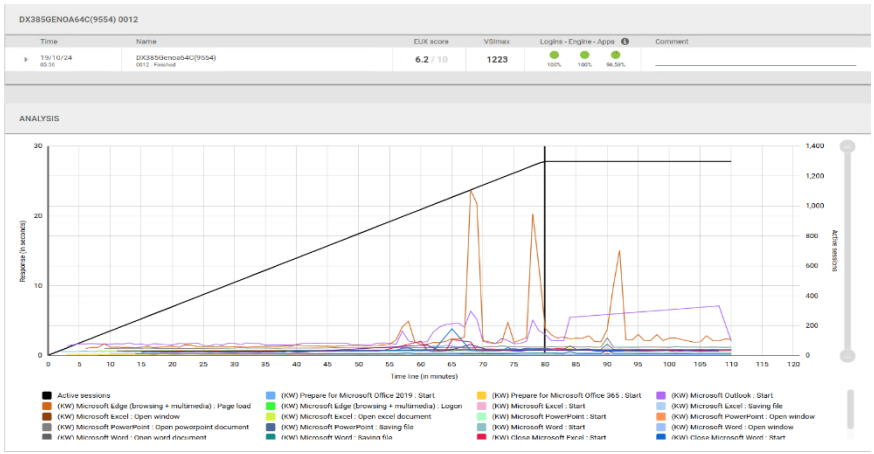


Figure 8: Median Login Enterprise application response times with increasing virtual desktop density (four 2P 64-core AMD EPYC 9554 nodes)

TEST CONFIGURATION

ITEM	DESCRIPTION		
Servers	cluster used 4 x Dual-Socket HPE DX 385 Gen 11		
CPUs per Server	2 x AMD EPYC 9174F (16 cores/CPU)	2 x AMD EPYC 9374F (32 cores/CPU)	2 x AMD EPYC 9554 (64 cores/CPU)
Frequency: Base | Boost[1]	4.15 GHz | 4.40 GHz	3.85 GHz | 4.30 GHz	3.10 GHz | 3.75 GHz
L3 Cache	256 MB per CPU		
Memory	1.5 TB DDR5 4800 MT/s per server		
NIC	100 Gb		
Storage	8 x 3.2 TB SATA SSD Each capacity disk was 3.2 TB, 2 480 GB NVMe SSD (Boot) (~86 TB total usable storage, of which testing used ~3.0 TB with Nutanix deduplication and erasure coding disabled and compression enabled)		
Hypervisor	VMware® ESXi® 8.0.2		
Nutanix AOS	6.8		
Workspace Service	VMware Horizon® 8.0.2 (via Launcher VMs to connect using the VMware® Blast protocol with 150 Launcher VMs)		
Login Enterprise	5.9.9 with benchmark mode enabled and Knowledge Worker profile selected		
BIOS Version	A55 v1.42 (default options used)		
VM OS	Microsoft Windows 10 Enterprise LTSC 64-bit (build 1809)		
VM Application	Microsoft Office LTSC Professional Plus 2019		

Table 1: Cluster configurations

CONCLUSION

AMD EPYC 9004 Series Processors continue to redefine the standards for modern datacenters. 4th Gen AMD EPYC processors are built on the innovative x86 architecture and "Zen 4" core. 4th Gen AMD EPYC processors deliver efficient, optimized performance by combining high frequencies, the largest-available L3 cache, 128 lanes of PCIe® 5 I/O (1P) and up to 160 lanes (2P), and synchronized fabric and memory clock speeds, plus support for up to 6 TB of DDR5-4800 memory. Built-in security features, such as Secure Memory Encryption (SME) and Secure Encrypted Virtualization (SEV-SNP), collectively known as AMD Infinity Guard, help protect data while it is in use.[2]

HPE DX 385 Gen 11 servers with AMD EPYC and Nutanix powered by general purpose and high-frequency 4th Gen AMD EPYC processors deliver high performance and high user densities for VDI deployments. Servers powered by AMD EPYC processors deliver outstanding performance with over 300+ world records across a broad range of workloads. Please refer to the *Virtual Desktop Infrastructure (VDI) Tuning Guide for AMD EPYC™ 9004 Series Processors* for detailed information on fine-tuning your server to run VDI deployments. This Tuning Guide is available from the AMD Documentation Hub.

FOR ADDITIONAL INFORMATION

Please see the following additional resources for more information about 4th Gen AMD EPYC features, architecture, and available models:

- AMD EPYC™ 9004 Series Processors
- AMD Documentation Hub
- AMD EPYC™ Products

REFERENCES

1. Maximum boost for AMD EPYC processors is the maximum frequency achievable by any single core on the processor under normal operating conditions for server systems. EPYC-18
2. AMD Infinity Guard features vary by EPYC™ Processor generations and/or series. Infinity Guard security features must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at http://www.amd.com/en/products/processors/server/epyc/infinity-guard.html. GD-183-A

AUTHORS
Muhammad Ashfaq and Jesse Rangel

- Nutanix*
- VMware ESXi*
- AMD EPYC™ Processors
- AMD Documentation Hub

*Links to third party sites are provided for convenience and unless explicitly stated, AMD is not responsible for the contents of such linked sites and no endorsement is implied.

AMD EPYC 9004 FOR HYPERCONVERGED INFRASTRUCTURE (HCI)

4th Gen AMD EPYC processors provide a leadership throughput computing foundation for Nutanix HCI. Together AMD and Nutanix have fully tested solutions demonstrating excellent workload performance, which helps to lower risk and reduce implementation costs for customers.

"ZEN 4" CORE & SECURITY FEATURES

General purpose and high-frequency AMD EPYC 9004 processors support up to:

- 96 physical cores, 192 threads
- 384 MB of L3 cache per CPU
- 32 MB of L3 cache per CCD
- 6 TB of DDR5-4800 memory
- 128 1P, up to 160 2P PCIe® Gen 5 lanes

Infinity Guard security features[2]

- Secure Boot
- Encrypted memory with SME

EXCEPTIONAL SCALABILITY

Scaling is critical to HCI applications. General purpose and high-frequency AMD EPYC 9004 processors provide high bandwidth between nodes with support for up to 128 (1P) or 160 (2P) lanes of PCIe® Gen 5 I/O. Each node can take advantage of up to 96 "Zen 4" or 128 "Zen 4c" cores per socket to achieve exceptional performance and scalability in virtualized environments.

VMWARE ESXI HYPERVISOR

VMware ESXi is a robust bare-metal hypervisor that installs directly onto a physical server and provides direct access to and effective partitioning of system resources for optimal application consolidation and cost optimization.