BẢNG SO SÁNH CÁC GIẢI PHÁP HCI của DELL (ScaleIO), VMware (vSAN) và Nutanix

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| **Hãng** | **VMware** | **Nutanix** | **DELL-EMC** |
| Overview | Name: vSAN Type: Software-only (SDS) Development Start: Unknown First Product Release: 2014 | Name: Enterprise Cloud Platform (ECP) Type: Hardware+Software (HCI) Development Start: 2009 First Product Release: 2011 | Name: ScaleIO Elastic Converged Storage (ECS) Type: Software-only (SDS) Development Start: Early 2011 First Product Release: dec 2012 |
| Phiên bản | Release Dates:  vSAN 6.6.1: jul 2017 vSAN 6.6: apr 2017  vSAN 6.5: nov 2016  vSAN 6.2: mar 2016  vSAN 6.1: aug 2015  vSAN 6.0: mar 2015  vSAN 5.5: mar 2014 | Release Dates:  AOS 5.5: dec 2017  AOS 5.1.2 / 5.2\*: sep 2017 AOS 5.1.1.1: jul 2017  AOS 5.1: may 2017  AOS 5.0: dec 2016  AOS 4.7: jun 2016  AOS 4.6: feb 2016  AOS 4.5: oct 2015  NOS 4.1: jan 2015  NOS 4.0: apr 2014  NOS 3.5: aug 2013  NOS 3.0: dec 2012 | Release Dates:  ScaleIO 2.0: mar 2016 ScaleIO 1.32: may 2015 ScaleIO 1.31: dec 2014 ScaleIO 1.30: sep 2014 ScaleIO 1.20: oct 2013 ScaleIO 1.10: dec 2012 |
| Hardware Pricing Model | N/A | Per Node | N/A |
| Software Pricing Model | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Per CPU Socket Per Desktop (VDI use cases only) Per Used GB (VCPP only) | Per Node | Per TB |
| Support Pricing Model | Per CPU Socket Per Desktop (VDI use cases only) | Per Node | Per TB |
| Consolidation Scope | Hypervisor Compute Storage Data Protection (limited) Management Automation&Orchestration | Hypervisor Compute Storage Data Protection (limited) Management Automation&Orchestration | Compute Storage |
| Evaluation Methods | Free Trial (60-days) Online Lab Proof-of-Concept (POC) | Community Edition (forever) Proof-of-Concept (POC) Partner Driven Demo Environment | Free Download (forever) Proof-of-Concept (POC) |
| Deployment Method | BYOS (fast, some automation) | Turnkey (very fast; highly automated) | BYOS (some automation) |
| Deployment Architecture | Single-Layer | Single-Layer (primary) Dual-Layer (secondary) | Single-Layer Dual-Layer |
| Network Topology | 1, 10 or 40 GbE | 1, 10 or 40 GbE | 1GbE or 10GbE |
| Hypervisor Deployment | Kernel Integrated | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Virtual Storage Controller | vSphere: Virtual Storage Controller + kernel module Hyper-V/KVM: OS Drivers and packages |
| Hypervisor Compatibility | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  VMware vSphere ESXi 6.5U1 | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  VMware vSphere ESXi 5.5U3-6.5U1 Microsoft Hyper-V 2012 R2 and 2016\* Microsoft CPS Standard Nutanix Acropolis Hypervisor (AHV) Citrix XenServer 7.1 | VMware vSphere ESXi 5.5-6.0 Microsoft Hyper-V 2008R2-2012R2 Linux KVM Citrix Xenserver 6.5 |
| Hypervisor Interconnect | vSAN | NFS SMB3 iSCSI | ScaleIO |
| Bare Metal Compatibility | Many | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Microsoft Windows Server 2008R2/2012R2/2016 Red Hat Enterprise Linux (RHEL) 6.7/6.8/7.2 SLES 11/12 Oracle Linux 6.7/7.2 AIX 7.1/7.2 on POWER Oracle Solaris 11.3 on SPARC ESXi 5.5/6 with VMFS (very specific use-cases) | Microsoft Windows Server Linux Distributions |
| Bare Metal Interconnect | iSCSI | iSCSI | Block Device Driver |
| VDI Compatibility | VMware Horizon Citrix XenDesktop | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  VMware Horizon Citrix XenDesktop (certified) Citrix Cloud (certified) Workspot VDI | VMware Horizon Citrix XenDesktop |
| VDI Load Bearing | VMware: up to 200 virtual desktops/node Citrix: up to 90 virtual desktops/node | VMware: up to 160 virtual desktops/node Citrix: up to 120 virtual desktops/node | VMware: unknown Citrix:unknown |
| Hardware Choice | Many | Super Micro (Nutanix branded) Super Micro (source your own) Dell (OEM) IBM (OEM) Lenovo (OEM) Cisco UCS (Select) HPE (Select) Crystal (Rugged) Klas Telecom (Rugged) Many (CE only) | Many |
| Models | Many | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  6 Native Models (SX-1000, NX-1000, NX-3000, NX-6000, NX-8000, NX9000) 15 Native Model sub-types | Many |
| Density | 1, 2 or 4 nodes per chassis | Native: 1 (NX3000, NX8000) 2 (NX6000, NX8000) 4 (NX1000, NX3000) 3 or 4 (SX1000) nodes per chassis | 1, 2 or 4 nodes per chassis |
| Mixing Allowed | Yes | Yes | Yes |
| CPU Config | Flexible | Flexible: up to 5 options | Flexible |
| Memory Config | Flexible | Flexible: up to 10 options | Flexible |
| Storage Config | Flexible: number of disks + capacity | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Flexible: capacity (up to 7 options per disk type); number of disks (Dell, Cisco) Fixed: Number of disks (hybrid, most all-flash) | Flexible |
| Network Config | Flexible | Flexible: up to 4 add-on options | Flexible |
| GPU Config | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  NVIDIA Tesla AMD FirePro Intel Iris Pro | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  NVIDIA Tesla (specific appliance models only) | NVIDIA Tesla AMD FirePro Intel Iris Pro |
| Scale-up | CPU Memory Storage GPU | Memory Storage GPU | CPU Memory Storage GPU |
| Scale-out | Compute+storage Compute-only (vSAN VMKernel) | Compute+storage Compute-only (NFS; SMB3) Storage-only | Compute+storage Compute-only (SDC) Storage-only |
| Scalability | 2-64 nodes in 1-node increments | 3-Unlimited nodes in 1-node increments | 3-1024 storage nodes in 1-node increments |
| Small-scale (ROBO) | 2 Node minimum | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  3 Node minimum (data center) 1 Node minimum (ROBO) 1 Node minimum (backup) | 3 Node minimum |
| Layout | Object Storage File System (OSFS) | Distributed File System (ADSF) | Block Pool |
| Data Locality | Partial | Full | None |
| Type(s) | Direct-attached (Raw) | Direct-attached (Raw) | Direct-attached (Raw, RAID, File) |
| Composition | Hybrid (Flash+Magnetic) All-Flash | Hybrid (Flash+Magnetic) All-Flash | Magnetic-Only Hybrid All-Flash |
| Hypervisor OS Layer | SD, USB or DOM | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  SuperMicro (G3,G4,G5): DOM SuperMicro (G6): M2 SSD Dell: SD or SSD Lenovo: DOM, SD or SSD Cisco: SD or SSD | SD, USB or DOM |
| Memory Layer | DRAM | DRAM | DRAM |
| Memory Purpose | Read Cache | Read Cache | Read Cache |
| Memory Capacity | Non-configurable | Configurable | Configurable |
| Flash Layer | SSD, PCIe, UltraDIMM, NVMe | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  SSD, NVMe | SSD, PCIe, UltraDIMM, NVMe |
| Flash Purpose | Hybrid: Read/Write Cache All-Flash: Write Cache + Storage Tier | Read/Write Cache Storage Tier | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Read Cache Write Buffer (Flash Storage Pools) Storage Tier |
| Flash Capacity | Hybrid: 1-5 Flash devices per node (1 per disk group) All-Flash: 40 Flash devices per node (8 per disk group) | Hybrid: 1-4 SSDs per node All-Flash: 3-24 SSDs per node | 0 - 64 devices per node |
| Flash Pinning | Cache Read Reservation: Per VM/Virtual Disk | Flash Mode: Per VM/Virtual Disk/iSCSI LUN | Per Volume |
| Magnetic Layer | SAS or SATA | Hybrid: SATA | SAS or SATA |
| Magnetic Purpose | Persistent Storage | Persistent Storage | Write Buffer (HDD Storage Pools) Storage Tier |
| Magnetic Capacity | 1-35 SAS/SATA HDDs per host/node | 2-20 SATA HDDs per node | 0 - 64 devices per node |
| Persistent Write Buffer | Flash Layer (SSD;PCIe;NVMe) | Flash Layer (SSD) | Flash/HDD |
| Disk Failure Protection | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Hybrid/All-Flash: 0-3 Replicas (RAID1; 1N-4N) All-Flash: Erasure Coding (RAID5-6) | 1-2 Replicas (2N-3N) Erasure Coding (optional) | 1 Replica (2N) + opt. Hardware RAID |
| Node Failure Protection | Hybrid/All-Flash: 0-3 Replicas (RAID1; 1N-4N) All-Flash: Erasure Coding (RAID5-6) | 1-2 Replicas (2N-3N) Erasure Coding (optional) | 1 Replica (2N) + opt. Hardware RAID |
| Block Failure Protection | Failure Domains | Block Awareness (integrated) | Fault Sets |
| Rack Failure Protection | Failure Domains | Block ID (CLI) | Fault Sets |
| Data Corruption Detection | Read integrity checks Disk scrubbing (software) | Read integrity checks Disk scrubbing (software) | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Disk scrubbing (software) In-flight integrity checks |
| Snapshot Type | Built-in (native) | Built-in (native) | Built-in (native) |
| Snapshot Scope | Local | Local + Remote | Local |
| Snapshot Frequency | GUI: 1 hour | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  GUI: 1-15 minutes (nearsync replication); 1 hour (async replication) | N/A |
| Snapshot Granularity | Per VM | Per VM | Per Volume |
| Backup Type | N/A (not part of vSAN license) | Built-in (native) | N/A |
| Backup Scope | VDP: Locally To remote sites To VMware vCloud Air (requires subscription) | To local single-node To local and remote clusters To AWS and MS Azure Cloud | VDP: Locally To remote sites To VMware vCloud Air (requires subscription) |
| Backup Frequency | VDP: 24 hours | NearSync to remote clusters: 1-15 minutes\* Async to remote clusters: 1 hour AWS/Azure Cloud: 1 hour | VDP: 24 hours |
| Backup Consistency | VDP: File System Consistent (Windows) VDP: Application Consistent (MS Apps on Windows) | File System Consistent (Windows) Application Consistent (MS Apps on Windows) | VDP: File System Consistent (Windows) VDP: Application Consistent (MS Apps on Windows) |
| Restore Granularity | Entire VM (local snapshots) Entire VM or Single File (VDP backups) | Entire VM or Single File (local snapshots) | Entire Volume (snapshots) Entire VM or Single File (VDP backups) |
| Restore Ease-of-use | Entire VM: GUI Single File: GUI | Entire VM: GUI Single File: GUI, nCLI | Entire VM: GUI Single File: GUI |
| Remote Replication Type | Built-in (Stretched Cluster only) | Built-in (native) | N/A |
| Remote Replication Scope | VR: To remote sites, To VMware clouds | To remote sites To AWS and MS Azure Cloud | RP: To remote sites |
| Remote Replication Topologies | VR: Single-site and multi-site | Single-site and multi-site | RP: Single-site and multi-site |
| Remote Replication Frequency | VR: 5 minutes (Asynchronous) vSAN: Continuous (Stretched Cluster) | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Synchronous to remote cluster: continuous NearSync to remote clusters: 1-15 minutes\* Async to remote clusters: 1 hour AWS/Azure Cloud: 1 hour | RP: Continuous (near-synchronous) |
| Remote Replication Granularity | VR: VM | VM iSCSI LUN | RP: VM RP: Volume |
| Consistency Groups | VR: No | Yes | RP: Yes |
| DR Orchestration | VMware SRM (certified) | VMware SRM (certified) | RP4VM RP+SRM |
| Stretched Cluster (SC) | VMware vSphere: Yes (certified) | vSphere: Yes Hyper-V: Yes AHV: No | N/A |
| SC Configuration | 3-sites: two active sites + tie-breaker in 3rd site | vSphere: 3-sites = two active sites + tie-breaker in 3rd site Hyper-V: 2-sites = two active sites, no tie-breaker | N/A |
| SC Distance | <=5ms RTT | <=5ms RTT / <400 KMs | N/A |
| SC Scaling | <=15 hosts at each active site | No set max. # Nodes; Mixing hardware models allowed | N/A |
| SC Data Redundancy | Replicas: 0-3 Replicas (1N-4N) at each active site Erasure Coding: RAID5-6 at each active site | Replicas: 1N at each active site Erasure Coding (optional): Nutanix EC-X at each active site | N/A |
| Dedup/Compr. Engine | All-Flash: Software Hybrid: N/A | Software | N/A |
| Dedup/Compr. Function | Efficiency (Space savings) | Efficiency (full) and Performance (limited) | N/A |
| Dedup/Compr. Process | All-Flash: Inline (post-ack) Hybrid: N/A | Perf. Tier: Inline (dedup post-ack / compr pre-ack) Cap. Tier: Post-process | N/A |
| Dedup/Compr. Type | All-Flash: Optional Hybrid: N/A | Dedup Inline: Optional Dedup Post-Process: Optional Compr. Inline: Optional Compr. Post-Process: Optional | N/A |
| Dedup/Compr. Scope | Persistent data layer | Dedup Inline: memory and flash layers Dedup Post-process: persistent data layer (adaptive) Compr. Inline: flash and persistent data layers Compr. Post-process: persistent data layer (adaptive) | N/A |
| Dedup/Compr. Granularity | Per Cluster | Per Container | N/A |
| Dedup/Compr. Guarantee | N/A | N/A | N/A |
| Data Rebalancing | Full | Full | Full |
| Fast VM Cloning | Yes | Yes | No |
| Data Encryption | Hardware: Data-at-rest encryption through self-encrypting drives Software: Built-in (native) data-at-rest encryption; HyTrust DataControl (validated) | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Hardware: Data-at-rest encryption through self-encrypting drives Software: Built-in (native) data-at-rest encryption; Vormetric (validated), Gemalto (verified) | Hardware: Data-at-rest encryption through self-encrypting drives Software: Built-in (native) |
| Task Offloading | vSphere: Integrated | Vsphere: VMware VAAI-NAS (full) Hyper-V: SMB3 ODX; UNMAP/TRIM AVH: Integrated | No |
| QoS Type | IOPs Limits (maximums) | N/A | IOPs and/or MBps Limits (maximums) |
| QoS Granularity | Per VM/Virtual Disk | N/A | Per client and volume |
| Hypervisor Migration | Hyper-V to ESXi (external) | ESXi to AHV (integrated) AHV to ESXi (integrated) Hyper-V to AHV (external) | Hyper-V to ESXi (external) |
| Fileserver Type | N/A | Built-in (native) | N/A |
| Fileserver Compatibility | N/A | Windows Clients Apple Mac Clients | N/A |
| Fileserver Interconnect | N/A | SMB | N/A |
| Fileserver Quotas | N/A | Share Quotas, User Quotas | N/A |
| GUI Functionality | Centralized | Centralized | Centralized |
| GUI Scope | Single-site and Multi-site | Prism: Single-site Prism Central: Multi-site | Single-system |
| GUI Perf. Monitoring | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Advanced | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Advanced | Basic |
| GUI Integration | VMware vSphere Web Client (integrated) | VMware: Prism (subset) Microsoft: SCCM (SCOM and SCVMM) AHV: Prism File Services: Prism | VMware vSphere Web Client (plugin) |
| Policies | Full | Partial (Protection) | N/A |
| API/Scripting | REST-APIs Ruby vSphere Console (RVC) PowerCLI | REST-APIs PowerShell nCLI | REST-APIs PowerShell sCLI |
| Integration | OpenStack VMware vRealize Automation (vRA) | OpenStack VMware vRealize Automation (vRA) Nutanix Calm | OpenStack EMC ViPR Controller + ViPR vRealize Orchestrator Plug-in |
| Self Service | N/A (not part of vSAN license) | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  AHV only | N/A (not part of ScaleIO license) |
| SW Composition | Partially Distributed | Unified | Partially Distributed |
| SW Upgrade Execution | [NEW](https://www.whatmatrix.com/comparison/SDS-and-HCI)  Rolling Upgrade (1-by-1) | Rolling Upgrade (1-by-1) | Rolling Upgrade (1-by-1) |