Pivot3 Datacenter Series vs Nutanix on Next Generation Datacenter Requirements

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PRODUCTS

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Pivot3 Datacenter Series

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Nutanix

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Hyperconvergence is Reshaping the Enterprise Data Center

Virtualization largely shaped the enterprise data center landscape for the past ten years. Hyperconverged infrastructure (HCI) is beginning to have the same type of impact, re-shaping the enterprise data center to fully capitalize on the benefits that virtualizing the infrastructure affords them.

DCIG defines a hyperconverged infrastructure (HCI) as a solution that pre-integrates virtualized compute, storage and data protection functions along with a hypervisor and scale-out cluster management software. HCI vendors may offer their solutions as turnkey appliances, installable software or as an instance running on public cloud infrastructure. The most common physical instantiation of—and unit of scaling for—hyperconverged infrastructure is a 1U or 2U rackmountable appliance containing 1 – 4 cluster nodes.

Next-Generation Datacenter Requirements for Hyperconverged Infrastructure

The success of initial HCI deployments in reducing complexity, speeding time to deployment, and lowering costs compared to traditional architectures has opened the door to an expanded role in the enterprise data center. Indeed, HCI is rapidly becoming the core technology of the next-generation enterprise data center. In order to succeed as a core technology these HCI solutions must meet a new and demanding set of expectations.

Enterprises require core data center technologies to deliver:

1. Simplified management, including at scale
2. Workload consolidation, including mission-critical
3. High levels of availability, reliability and security
4. Flexible, agile scalability

DCIG Comparison Methodology

DCIG evaluated Pivot3 Datacenter Series and Nutanix against these key enterprise datacenter HCI in next-generation datacenters, since those will be the differentiators that drive business value and the outcomes enterprises expect from core IT infrastructure.

Pivot3 Datacenter Series HCI is based on its Acuity software platform which runs on the VMware ESXi hypervisor. Pivot3 brings robust intelligence and automation, including quality of service and resilient, efficient software defined storage to VMware-based infrastructures and integrates fully into the large VMware software ecosystem.

Nutanix also supports VMware but is building its full-stack solution around the KVM-based Acropolis Hypervisor (AHV) as an alternative to VMware ESXi. Nutanix promotes its Nutanix Enterprise Cloud as a full-stack solution running a single OS across multiple clouds.

Summary: Pivot3 Datacenter Series Meets the Needs of Next-generation Datacenters

- Policy-based management radically simplifies infrastructure and SLA management at any scale (reduces OPEX)
- Advanced Quality of Service (QoS) with Pivot3's multi-tiered NVMe flash-based architecture enables workload consolidation and eliminates the need to overprovision infrastructure (reduces CAPEX)
- Patented erasure coding with intelligent data layout delivers efficient, highly available and reliable storage (reduces CAPEX and eliminates downtime)
- Non-disruptive, granular scaling (increases agility, reduces CAPEX)

Simplified Management: Policy-based Management Reduces OPEX

Pivot3's automated policy-based approach to infrastructure management—including performance, data protection and security—is simple to implement yet powerful in operation. In performance, for example, simply assign one of five policies to a volume and the system dynamically optimizes the infrastructure to meet the pre-defined performance targets of every running workload. Pivot3 brings policy-based management oriented around the business value of workloads to the hyperconverged infrastructure marketplace.

Nutanix integrates a rapidly broadening portfolio of hybrid and multi-cloud services with a focus on simple deployment and ongoing infra-structure maintenance. It makes extensive use of AI/ML to advance these goals. (Figure 1.)

FIGURE 1: **SLA Management Simplicity**
Summary Comparison

	Pivot3 Datacenter Series	Nutanix
Automated policy-based SLA management of Performance, Data Protection and Security	✔	For Data Protection
Intelligent algorithms ensure that the customer's business priorities are honored	✔	●
QoS policy changes can be scheduled to match time-based or calendar-based changes in workload priority.	✔	●

KEY QUESTIONS TO ASK:

- How much time does your IT staff spend attempting to address SLA-related problems?

- What costs would failure to meet SLAs impose on the company?

Workload Consolidation through Advanced Quality of Service (QoS) Technology

Pivot3's Intelligence Engine provides the most advanced, yet simple to use QoS that DCIG analysts have evaluated. For performance, each policy assigned a volume or datastore establishes three targets: latency, IOPS and throughput. The Intelligence Engine then uses AI/ML technology to prioritize resources and actions in real-time, at scale, based on those policies. Advanced QoS working in conjunc-tion with Pivot3's NVMe flash based multi-tier architecture reduces CAPEX by enabling businesses to consolidate more workloads on less hardware. (Figure 2.)

Pivot3 advanced policy-based performance QoS:

- **Never artificially caps performance.** All workloads run at full performance until resource contention occurs.

- **Prioritizes applications based on business value.** Mission-critical workloads always receive priority access to resources and tasks related to them are executed before less critical workloads.

- **Enforces application performance—and data protection—poli-cies only when resource contention occurs.**

- **Can be reassigned on the fly.** Any QoS policy change goes into effect immediately.

- **Can be scheduled to match known time-based or calendar-based changes in workload priority.**

Nutanix "Autonomic QoS" automatically prioritizes user applications over back end operations whenever contention occurs. Nutanix AI/ML technology understands common workloads and prioritizes different kinds of IO from a given application accordingly. However, it is global and not user configurable.

Conclusion: AI/ML is great, especially when guided by site-specific business priorities. Pivot3's intelligent QoS and multi-tiered NVMe flash-based architecture eliminate the need to over-provision infra-structure and enables enterprises to confidently and safely consoli-date more workloads—including mission-critical—on less hardware than Nutanix. (Figure 3.)

FIGURE 3: **Quality of Service**
Summary Comparison

Pivot3 Datacenter Series	Nutanix
Rich policy-based QoS enforces targets for latency, IOPS and throughput / QoS honors site-specific business priorities	Autonomic QoS prioritizes user applications over back-end operations and based on its understanding of common workloads / Not user configurable
QoS intelligence also applies to snapshots and replication	●

FIGURE 2

Data protection and security also utilize a similar policy-based approach to save system admin time and include local and remote snapshot, retention periods, scheduling, job queue reservations, data at rest encryption, and key management.

KEY QUESTIONS TO ASK:

- For production environments, what are the recommended utilization percent-ages for CPU? DRAM? Raw storage capacity? Usable storage capacity?

- How much—or what percentage—of the overall cost of the proposed HCI solution is associated with overprovisioning of resources?

- Does the QoS implementation enable the system admin to instruct the HCI system on which applica-tions are higher priority than others and then the system acts on those priorities in real-time to meet application SLAs?

High Levels of Availability, Reliability and Security

Pivot3's patented erasure coding and intelligent data layout yields highly reliable and available storage with efficiency of up to 82% usable/raw before applying any compression. Pivot3 requires less hardware than its competitors to deliver a required level of availability and recovers from device failures rapidly. (Figure 4.)

FIGURE 4: **Failures to Tolerate & Number of Nodes Required**
Summary Comparison

Failures to Tolerate	Pivot3 Datacenter Series	Nutanix
1	3 nodes	3 nodes
2	3 nodes	5 nodes
3	3 nodes	5 nodes

All Pivot3 cluster members hold metadata maps of where each new or existing chunk of data should be stored. If a Pivot3 disk or node fails, all remaining nodes and disks contribute capacity to return the cluster to a fully protected status very quickly yet with minimal performance degradation. Also, since Pivot3 combines all the disk, cache, and networking resources into a single aggregated storage pool, the overall performance impact is reduced should one (or more) of those devices or drives fail.

Allied with this approach, the use of erasure coding increases the protection level of a volume to be able to tolerate the failure of three drives simultaneously or of an entire node and one additional drive, yet still maintain production availability and performance.

Nutanix builds availability primarily on less efficient RAID and replication technology. Consequently, customers must purchase (and maintain) 2x to 5x the raw storage capacity to meet their usable capacity requirements.

Nutanix allows multiple replication factors, compression and deduplication settings in a cluster. Nutanix recommends one container be created for each variation the cluster must support. VMs can then be granted capacity from whichever container(s) are most appropriate to their availability requirements.

Pivot3 and Nutanix are compliant with FIPS 140-2[1] and Common Criteria[2] standards. Both support data at rest encryption (DARE) and the KMIP[3] security key management standard. However, Pivot3's security is integrated into its Intelligence Engine's policy-based management paradigm to simplify security management even at scale.

Conclusion: Pivot3 Datacenter Series efficient architecture provides high levels of availability, reliability and security with fewer nodes than Nutanix while delivering more usable storage per unit of purchased capacity. (Figure 5.)

FIGURE 5: **Availability & Reliability**
Summary Comparison

	Pivot3 Datacenter Series	Nutanix
Availability Technology	Patented erasure coding	RAID plus 2-way, 3-way or 4-way Replication RAID 5/6 Erasure Coding
Level for Setting Replication Factor	Per Volume	Per Container
Usable vs Raw Capacity Efficiency Ratio	Up to 82%	33% - 66%
Premapped Data Blocks and Metadata Maps; data for each volume dispersed across all disks	✓	●
Common Criteria Certification	EAL 2+ Acuity v10.4 11/16/2018	EAL2+ VCP v3.5.1 9/22/2014
Data at Rest Encryption (DARE)	Software	SED, Software
FIPS 140-2	✓	✓
Key Management Interoperability Protocol (KMIP)	✓	✓

KEY QUESTIONS TO ASK:

- What percentage of raw capacity will be wasted to meet my availability requirements? How much extra cost will this wasted capacity incur across the lifecycle of this infrastructure?

- What happens to performance and availability when a cluster node or disk fails?

- How quickly can the solution self-heal to a fully protected state during node or disk failures?

- How does the solution integrate with common enterprise security management infrastructure to enable management at scale?

Flexible, Agile Scalability Reduces TCO

Truly Non-disruptive Scaling

When adding a Pivot3 node to a vPG (cluster), the Intelligence Engine automatically rebalances existing volumes in the background to take full advantage of the new node's resources.

Flexible Scaling

Pivot3 HCI clusters expand to meet virtually any data center require-ment. In addition to the standard node, Pivot3 offers compute nodes, GPU-enabled nodes and storage nodes in all-flash and hybrid config-urations. The beneficial implications of this flexibility include:

- Customers can configure each new node to precisely address the customer's needs without overprovisioning—and paying for—unneeded performance resources.

- Pivot3 is an equally effective infrastructure solution for remote office and branch office (ROBO) applications, BC/DR, high-end video surveillance and enterprise SAN.

Nutanix supports and encourages the use of mixed node clusters. It integrates new nodes in the background at a lower priority than application workloads. Nutanix is available on many server brands.

Conclusion: Pivot3's intelligent policy-based management, sophis-ticated QoS, advanced erasure coding and flexible non-disruptive scaling elegantly converge to deliver an enterprise-class hypercon-verged infrastructure solution. Taken together, these capabilities provide a compelling case for placing the Pivot3 Datacenter Series at the core of next generation data centers. (Figure 6.)

KEY QUESTIONS TO ASK:

- How many nodes are required to provide a highly available infrastructure solution?

- Are you looking to transition to an efficient, reliable and flexible hyperconverged infrastructure solution in a VMware-based enterprise environment or are you looking to replace VMware with an alternative cloud-focused solution stack? ■

FIGURE 6: Flexible Scaling
Summary Comparison

	Pivot3 Datacenter Series	Nutanix
Non-disruptive Operations	✓	✓
Existing Volumes Automatically Rebalanced	✓	✓
Minimum Deployment	3 nodes	1 node (not HA)
Maximum Cluster Size	16 nodes	Unlimited
Maximum Domain Size	Unlimited	Unlimited
Mixed Node Types in Cluster	✓	✓
Compute Nodes	✓	✓
GPU-enabled nodes	✓	✓
All-flash Storage Nodes	✓	✓
Hybrid Storage Nodes	✓	✓

Notes

1 FIPS – The FIPS 140-2 standard is an information technology security approval program for cryptographic modules produced by private sector vendors who seek to have their products certified for use in government departments and regulated industries (such as financial and health-care institutions) that collect, store, transfer, share and disseminate sensitive but unclassified (SBU) information.

2 Common Criteria – Common Criteria for Information Technology Security Evaluation is an international standard (ISO/IEC 15408) for computer security certification. Common Criteria provides assurance that the process of specification, implementation and evaluation of a computer security product has been conducted in a rigorous and standard and repeatable manner at a level that is commensurate with the target environment for use. (https://www.commoncriteriaportal.org/products/)

3 Key Management Interoperability Protocol (KMIP) is protocol for communication between encryption systems and a broad range of new and legacy enterprise applications.

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