
# VMware and Alternatives

Straight Answers to Tough Questions

Presented by: VMsources Group Inc.

# Agenda

- VMware and alternatives
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  - Choices: VMware and realistic alternatives
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# Why consider alternatives to VMware?

- Cost and/or perception of cost for VMware
- Perceived loss of value/equity in VMware licensing under Broadcom
- VMware licensing options under Broadcom
- Future of VMware development/support

# VMware and realistic alternatives

VMware vSphere

Microsoft Hyper-V

Nutanix

Proxmox

Others?

# VMware vSphere

## Advantages

- Most widely used and trusted platform
- Single-pane-of-glass management with vCenter
- Highly scalable
- Core X86 architecture
- HCI with vSAN is native
- Supported by many Business Continuity suites

## Disadvantages

- Cost / perceived cost
- Extra cost for Hyperconverged storage with vSAN
- Future of product development & support
- Limited hardware compatibility
- Trial/free version available?

# Comparison of vSphere Licenses core features

**vSphere Enterprise Plus**

- vCenter Standard
- Distributed Resource Scheduler (DRS)
- Distributed vSwitch
- vMotion
- Storage vMotion
- High Availability (HA)

**vSphere Standard**

- vCenter Standard
- vMotion
- Storage vMotion
- High Availability (HA)

**vSphere Essentials Plus**

- vCenter Essentials
- vMotion
- High Availability (HA)

vSphere Editions Compared: https://www.vmware.com/docs/vmw-datasheet-vsphere-product-line-comparison

# VMware Subscriptions, Packaging and Pricing

| Package | Per Core MSRP | Licenses Included/Notes |
|---|---|---|
| vSphere Cloud Foundation | $350 | vSphere Enterprise Plus, vSAN Enterprise, Aria Suite Enterprise, NSX Networking for VCF, HCX Enterprise, Aria Operations for Networks Enterprise, SDDC Manager |
| | | vSAN Enterprise 1 TiB free per-core licensed to be included in vSphere Cloud Foundation software release |
| vSphere Foundation | $135 | vSphere Enterprise Plus, vCenter Server Standard, Tanzu Kubernetes Grid, Aria Suite Standard, available Add-On's |
| | | vSAN Enterprise 0.25TB per-core licensed to be included in vSphere Foundation software release |
| vSphere Standard | $50 | vSphere Standard, vCenter Server Standard |
| vSphere Essentials Plus Kit | $35 | vSphere Essentials Plus, vCenter Server Essentials |
| | | *sold per 96-core kit, maximum of 3 hosts |

Source: https://community.veeam.com/blogs-and-podcasts-57/decoding-the-new-broadcom-vmware-vsphere-licensing-packages-for-small-deployments-6398

# CPU Cores for VMware Clusters

- Choosing the correct number of cores for your VMware ESXi hosts is important
  - Broadcom has a minimum license requirement of 16 cores/CPU
    - More than 16 cores/CPU and you will need to buy additional licenses
    - Fewer than 16 cores/CPU and you will still need to license 16 cores/CPU
- Fast 16 core CPUs give you more bang for the buck over time with VMware/Broadcom

| CPU Choice | vSphere STD/yr/cluster[&] | Total CPU |
|---|---|---|
| 12 cores/CPU X 6 CPUs@ 2.4 Ghz. (legacy cluster) | $4,800* | 172.6 Ghz. |
| 24 cores/CPU X 6 CPUs @ 2.4 Ghz. (typical cluster) | $7,200 | 345.6 Ghz.[+] |
| 16 cores/CPU X 6 CPUs @ 3.6 Ghz. (optimized cluster) | $4,800 | 345.6 Ghz.[#] |

[&]Cluster size = 3 hosts / 6 CPUs
*12 core CPUs will be licensed at 16 cores due to Broadcom license terms
[+]24 core CPUs are affordable, but will cost more annually in your VMware/Broadcom license and typically have a lower speed
[#]16 core CPUs @ 3.4 Ghz. cost a little more, but yield the same COMPUTE for a lower annual license cost

# VMware Licensing Cost

| vSphere Licensing Options | | | |
|---|---|---|---|
| | **Single host with 2 X 8-Core CPUs** | **3-Host cluster with 6 X 16-core CPUs** | **3-Host cluster with 6 X 24-core CPUs** |
| **vSphere Standard** [A] | $3,600/year (72 cores/contract) | $4,800/year (vSAN not included) | $7,200/year (vSAN not included) |
| **vSphere Foundation** [B] | $9,720/year (72 cores/contract) | $12,960/year (vSAN up to 24 TB) | $19,440/year (vSAN up to 36 TB) |
| **vSphere Cloud Foundation** [C] | $25,200/year (72 cores/contract) | $33,600/year (vSAN up to 96 TB) | $50,300/year (vSAN up to 144 TB) |
| **vSphere Essentials Plus Kit** [D] | $3,360/year | $3,360/year (vSAN not included) | Not Available, exceeds 96 core capacity |

**vSphere "fine print"**

[A] vSphere Standard, vCenter Server Standard

[B] vSphere Enterprise Plus, vCenter Server Standard, 0.25TB/core vSAN Enterprise

[C] vSphere Enterprise Plus, vCenter Server Standard, 1TB/core vSAN Enterprise

[D] vSphere Essentials Plus, vCenter Server Essentials, per 96-core kit, maximum 3 hosts

# Real-World CAPEX for VMware Clusters

## VMware with traditional SAN

- 3-node HPE cluster ($104,000)
  - 6 X Intel 6444Y 3.6GHz 16C CPU
  - 576 GB RAM
  - 6 X 1TB Install SSD
  - 18 TB NET HPE MSA iSCSI SAN
  - 3-yr Tech Care Essential Warranty
- On-Site installation 4-days

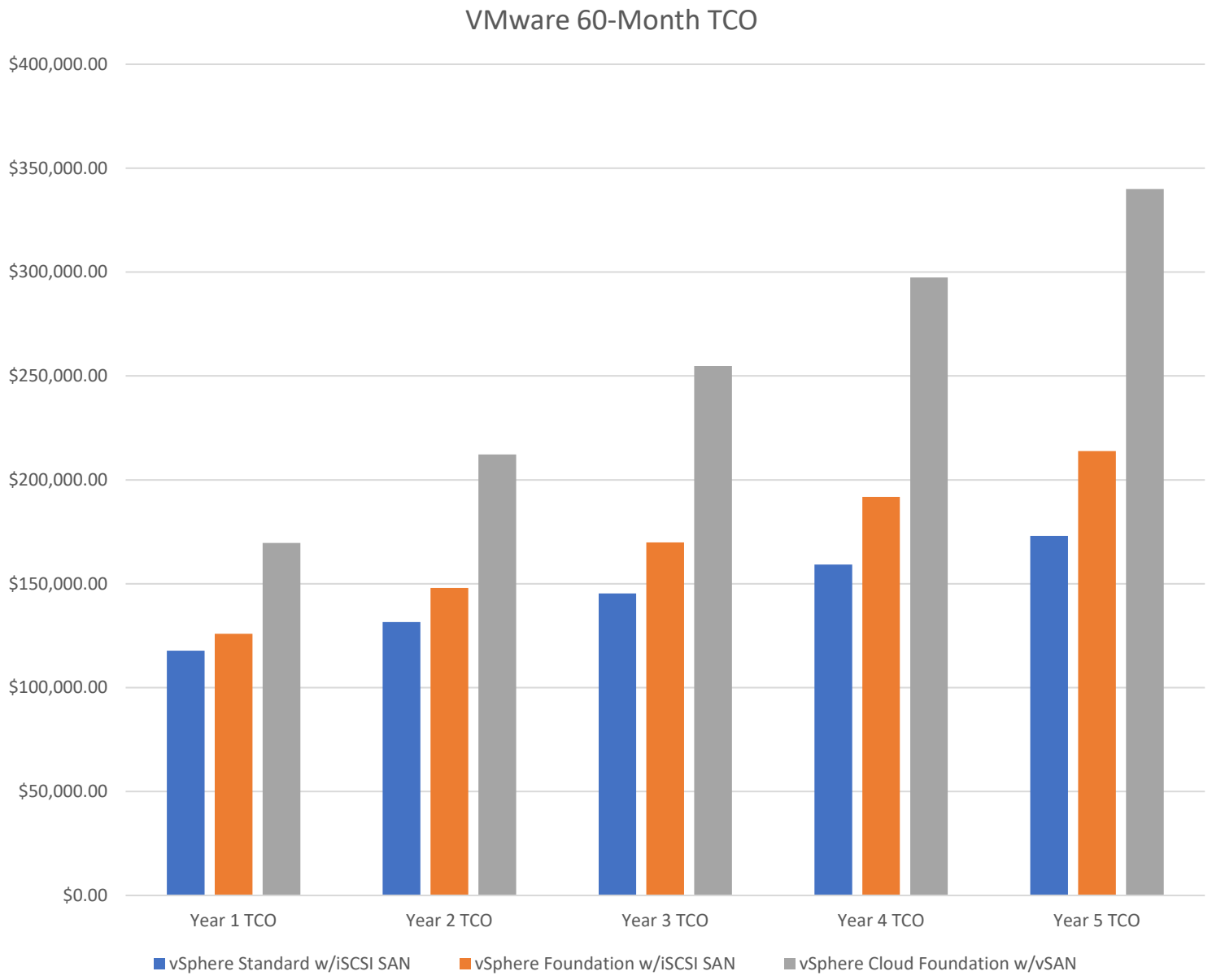
## VMware with vSAN

- 3-node HPE cluster ($127,000)
  - 6 X Intel 6444Y 3.6GHz 16C CPU
  - 576 GB RAM
  - 6 X 1TB Install SSD
  - 16 TB vSAN NET
    - 6 X 1TB Cache Disks
    - 12 X 4 TB Capacity disks
  - 3-yr Tech Care Essential Warranty
- On-site installation 4-days

# CAPEX + OPEX for VMware Clusters

| | vSphere Standard w/iSCSI SAN | vSphere Foundation w/iSCSI SAN | vSphere Cloud Foundation w/vSAN |
|---|---|---|---|
| **CAPEX** | | | |
| **Cluster Hardware** | $95,000.00 | $95,000.00 | $116,000.00 |
| **On-prem Installation** | $9,000.00 | $9,000.00 | $9,000.00 |
| **TOTAL CAPEX:** | $104,000.00 | $104,000.00 | $125,000.00 |
| | | | |
| **OPEX** | | | |
| **MSP** | $9,000.00 | $9,000.00 | $9,000.00 |
| **VMware** | $4,800.00 | $12,960.00 | $33,600.00 |
| **TOTAL OPEX:** | $13,800.00 | $21,960.00 | $42,600.00 |

# VMware 60-Month TCO



# Proxmox VE

## Advantages

- Cost
- KVM Hypervisor
- Wide hardware compatibility
- HCI included at all license levels
- Proxmox full feature Open-Source edition – no cost, no support
- Supported by many Business Continuity suites
- Has native backup/DRaaS Tools
- Embedded migration from VMware
- Native container support

## Disadvantages

- Manageable only per cluster
- Required Linux / technical skills

# Proxmox VE Pricing

## PREMIUM

All you'll ever need

€ 1060 /year & CPU socket

Buy now

- Access to Enterprise repository
- Complete feature-set
- Support via Customer Portal
- **Unlimited support tickets**
- Response time: 2 hours* within a business day
- Remote support (via SSH)
- Offline subscription key activation

## STANDARD

Most popular

€ 530 /year & CPU socket

Buy now

- Access to Enterprise repository
- Complete feature-set
- Support via Customer Portal
- **10 support tickets/year**
- Response time: 4 hours* within a business day
- Remote support (via SSH)
- Offline subscription key activation

## BASIC

For growing businesses

€ 355 /year & CPU socket

Buy now

- Access to Enterprise repository
- Complete feature-set
- Support via Customer Portal
- **3 support tickets/year**
- Response time: 1 business day

## COMMUNITY

Starting out

€ 115 /year & CPU socket

Buy now

- Access to Enterprise repository
- Complete feature-set
- Community support

# Proxmox VE Licensing Cost

| | Single host with 2 X 8-Core CPUs | 3-Host cluster with 6 X 16-core CPUs | 3-Host cluster with 6 X 24-core CPUs |
|---|---|---|---|
| **Proxmox VE Licensing Options** | | | |
| **Proxmox VE Open-Source*[1]** | €0/year | €0/year | €0/year |
| **Proxmox VE Community*[+]** | €230/year | €690/year | €690/year |
| **Proxmox VE Basic*[+#]** | €710/year | €2,130/year | €2,130/year |
| **Proxmox VE Standard*[+#]** | €1,060/year | €3,180/year | €3,180/year |
| **Proxmox VE Premium*[+#]** | €2,120/year | €6,360/year | €6,360/year |
| **Proxmox VE "fine print"** | | | |
| *All Versions Include Complete Feature Set including clustering and HCI CEPH Storage | | | |
| [+]Access to Enterprise Repositories | | | |
| [#]Includes support tickets with Proxmox | | | |
| [1]No-Subscription Repository only | | | |

# Real-World CAPEX for Proxmox Clusters

## Proxmox VE with traditional SAN

- 3-node HPE cluster ($104,000)
  - 6 X Intel 6444Y 3.6GHz 16C CPU
  - 576 GB RAM
  - 6 X 1TB Install SSD
  - 18 TB NET HPE MSA iSCSI SAN
  - 3-yr Tech Care Essential Warranty
- On-Site installation 4-days

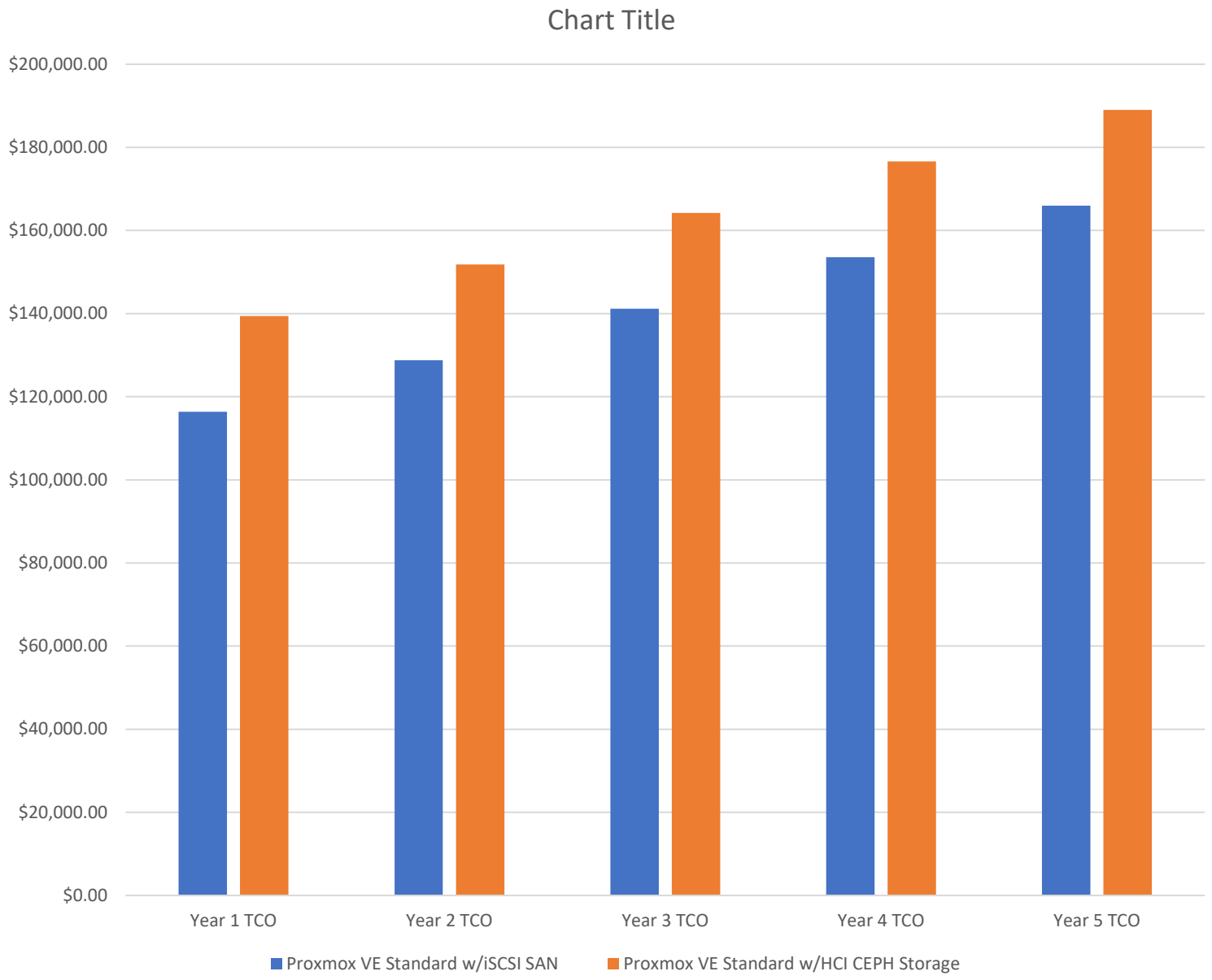
## Proxmox VE with HCI CEPH Storage

- 3-node HPE cluster ($127,000)
  - 6 X Intel 6444Y 3.6GHz 16C CPU
  - 576 GB RAM
  - 6 X 1TB Install SSD
  - 16 TB vSAN NET
    - 6 X 1TB Cache Disks
    - 12 X 4 TB Capacity disks
  - 3-yr Tech Care Essential Warranty
- On-site installation 4-days

# CAPEX + OPEX for Proxmox VE Clusters

| | Proxmox VE Standard w/iSCSI SAN | Proxmox VE Standard w/HCI CEPH Storage |
|---|---|---|
| **CAPEX** | | |
| **Cluster Hardware** | $95,000.00 | $118,000.00 |
| **On-prem Installation** | $9,000.00 | $9,000.00 |
| **TOTAL CAPEX:** | $104,000.00 | $127,000.00 |
| | | |
| **OPEX** | | |
| **MSP** | $9,000.00 | $9,000.00 |
| **Proxmox VE Standard** | $3,180.00 | $3,150.00 |
| **TOTAL OPEX:** | $12,180.00 | $12,180.00 |

# Proxmox VE 60-Month TCO



# Microsoft Hyper-V

## Advantages

- Included with Windows Server
- Supported by many Business Continuity suites
- Wide hardware compatibility
- 180-day trial

## Disadvantages

- Systems Center licensing extra
- Complex management consoles
- No native HCI options at this time
- Struggle with scalability of networking and managing many networks

# Real-World CAPEX for Hyper-V Clusters

- Hyper-V with traditional SAN
  - 3-node HPE cluster ($104,000)
    - 6 X Intel 6444Y 3.6GHz 16C CPU
    - 576 GB RAM
    - 6 X 1TB Install SSD
    - 18 TB NET HPE MSA iSCSI SAN
    - 3-yr Tech Care Essential Warranty
  - On-Site installation 4-days

# Nutanix

## Advantages

- Nutanix AHV Hypervisor (Based on KVM)
- Nutanix Prism management console
- Supported by many Business Continuity suites
- Has native backup/DRaaS Tools
- Migration tools from VMware
- Trial: Nutanix CE

## Disadvantages

- Cost
- HCI only, traditional SAN discouraged or not supported
- Limited HCL
- Probably requires full hardware refresh
- No published pricing

# Nutanix License Cost

- Nutanix is proprietary and does not publish prices

# Real-World CAPEX for Nutanix Clusters

- Nutanix HCI Cluster
- 3-node HPE cluster ($127,000)
  - 6 X Intel 6444Y 3.6GHz 16C CPU
  - 576 GB RAM
  - 6 X 1TB Install SSD
  - 16 TB vSAN NET
    - 6 X 1TB Cache Disks
    - 12 X 4 TB Capacity disks
  - 3-yr Tech Care Essential Warranty
- On-site installation 4-days

# Vendor-Agnostic Reference Architecture

Straight Answers to Tough Questions

# Cluster Design and Deployment

- Maximizing your investment through smart choices
  - Platform choice
  - Hyperconverged (HCI) storage or traditional SAN?
  - Cluster network speed

# Let’s consider Hyperconverged Storage (HCI)

## Advantages

- Requires no traditional SAN
- Potentially very fast
- Scalable
- Supports deduplication and encryption-at-rest

## Disadvantages

- Inefficient disk use in smaller clusters
- Cost of disks plus licensing may be prohibitive
- May have limited hardware/disk compatibility

# HCI Considerations

- Requires 3 nodes for quorum
- Requires 10GbE or faster networking
- HCI provides availability through "Network RAID" or "Storage Policy"
- You need to have *at least* one[1] full copy of all your data on an additional node if not two[2] additional nodes
  - A 1 TB Virtual Machine running in a 3-node HCI cluster will either consume 2 TB or 3 TB

| 3-Node HCI Cluster 18 X 4 TB SSD (Capacity) and 6 X 1 TB (Cache) | | | | | |
|---|---|---|---|---|---|
| 4 TB | 4 TB | 4 TB | 1 TB | | |
| 4 TB | 4 TB | 4 TB | 1 TB | | |
| | | | | | 72 TB RAW |
| 4 TB | 4 TB | 4 TB | 1 TB | | 35 TB NET[1] |
| 4 TB | 4 TB | 4 TB | 1 TB | | 24 TB NET[2] |
| | | | | | |
| 4 TB | 4 TB | 4 TB | 1 TB | | |
| 4 TB | 4 TB | 4 TB | 1 TB | | |

[1] Primary level of failures to tolerate (PFTT) = 1

[2] Primary level of failures to tolerate (PFTT) = 2

# Traditional SAN

- Traditional SANs:
  - Use RAID to achieve availability and RAM for cache
  - Present NET storage capacity after RAID
  - Support deduplication and encryption-at-rest

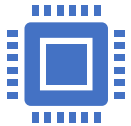
| Traditional SAN 10 X 4 TB SSD / RAID 6 (N-2) | | | | | | |
|---|---|---|---|---|---|---|
| 4 TB | 4 TB | 4 TB | 4 TB | 4 TB | | 40 TB RAW |
| 4 TB | 4 TB | 4 TB | 4 TB | 4 TB | | 32 TB NET |

# Cluster Sizing

Determine total workload requirement

Build in expected growth

Size your cluster N-1 (up to 8 nodes) or N-2 (9-16 nodes) to accommodate maintenance / node failure



Right-size the CPU to minimize licensing cost

Choose storage to meet capacity needs

With multiple cluster locations, consider deploying uniform server specifications to facilitate hardware interchangeability

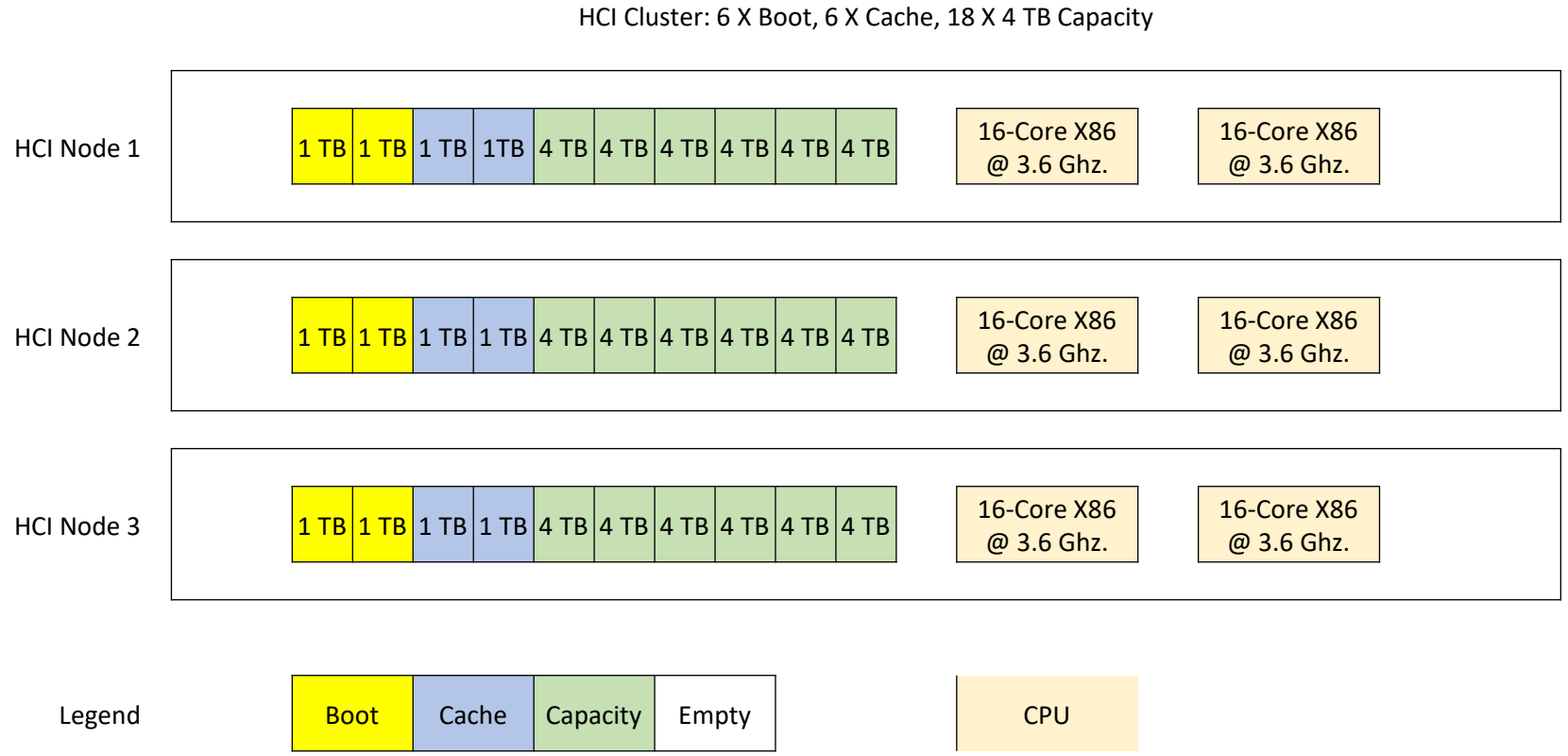
# Cluster Performance

- Cluster performance requirements will dictate many aspects of reference architecture requirements
  - Are there applications which require a minimum CPU speed?
  - Are there databases or other storage-performance sensitive workloads?

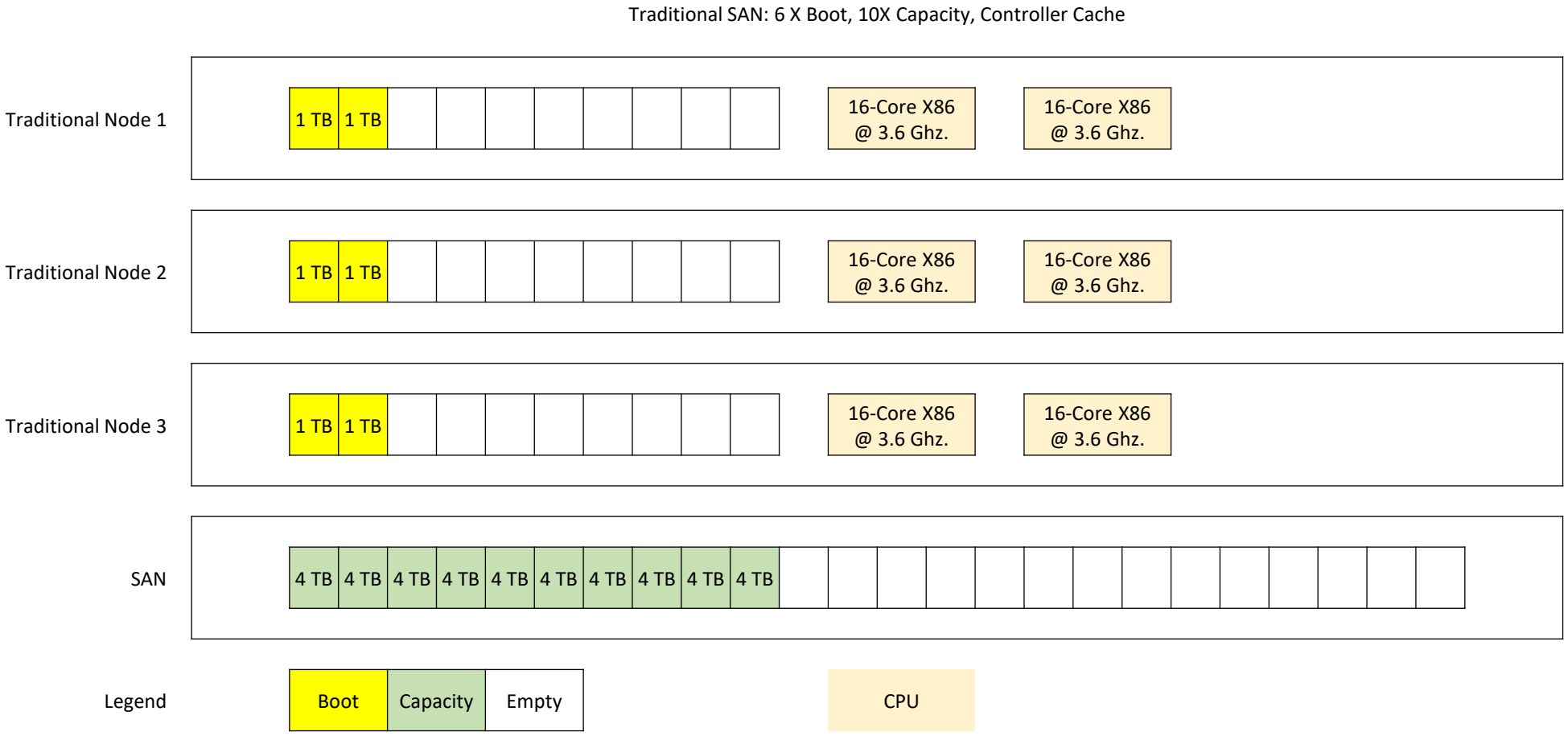
# Why a 3-Node Cluster?

- 3-node clusters are the meat and potatoes of Private Cloud computing
  - Scalable to support hundreds of high-performance workloads
  - Higher speed network with less physical switch traffic
  - More economical licensing
  - Less power consumption
  - Smaller footprint
- 3-node clusters can be configured with up to:
  - 2995 Ghz. (768 cores)
  - 6 or more TB of RAM
  - 72 HDD / SSD / NVMe drive slots
  - Enough Compute for several hundred high-performance workloads

# HCI Cluster Design



# Traditional Cluster Design



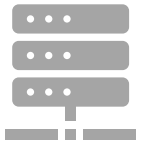
# “The Fire Print”

**Integrators and OEM vendors will often undersize their designs and quotes, just to get you to sign on the bottom line:**

Leaves you holding the bag after deployment

You either stay the course and make excuses for needing more money

Or you admit you were wrong and fire the vendor



**Some vendors will sell single-node or two-node “HCI” clusters**

This is nothing more than local storage, possibly supplemented with backup or replication

Two-node HCI clusters with a “witness” node are feasible but risky

**Deduplication / Compression can work well**

Deduplication and compression requires considerable Compute resources from the cluster where applied, be sure to account for that in cluster sizing

**Vendor “Appliances”**

Vendor “appliances” can range the gamut, but you need to check the spec’s and make sure that latest-gen CPUs and sufficient RAM are provided.

# About VMsources

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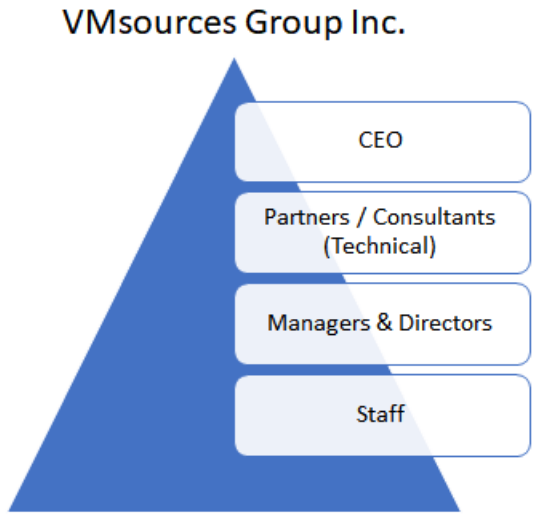


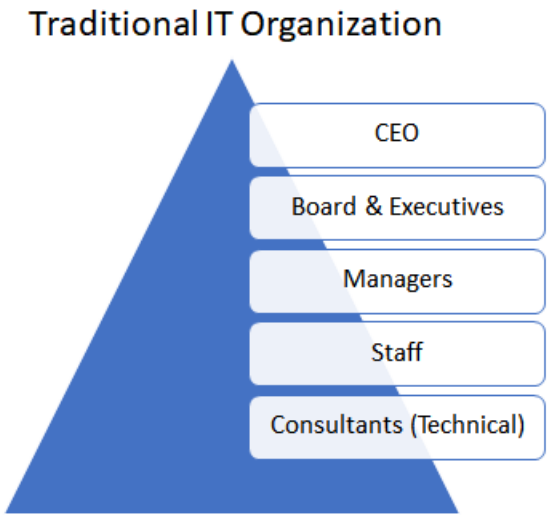


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