Hyperconverged Infrastructures

What they can do and where they're going

Eric Slack, Sr. Analyst
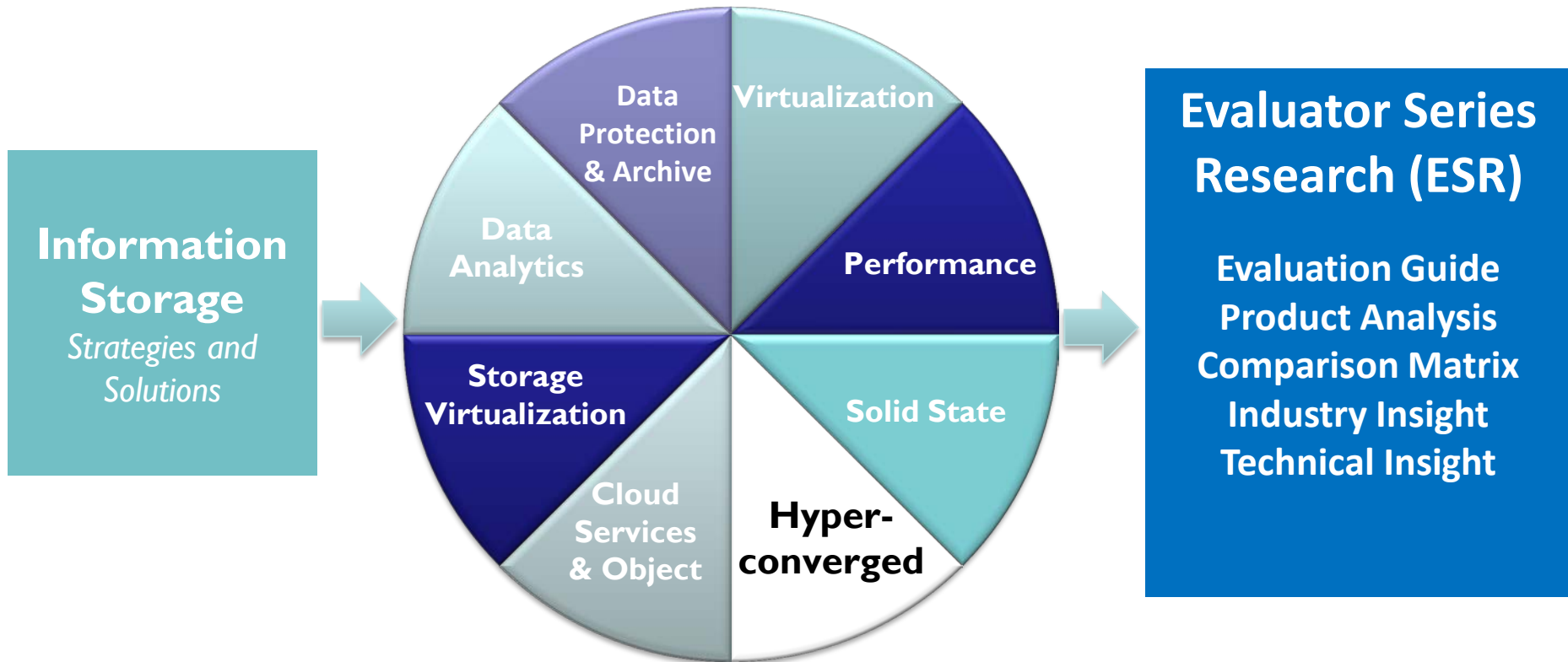**Evaluator Group**

Evaluator Group

Unbiased In-Depth Information on Information Management and Data Storage

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Evaluator Group - Research Coverage

Information Storage
Strategies and Solutions

Data Protection & Archive

Virtualization

Data Analytics

Performance

Storage Virtualization

Solid State

Cloud Services & Object

Hyper-converged

Evaluator Series Research (ESR)

Evaluation Guide
Product Analysis
Comparison Matrix
Industry Insight
Technical Insight

Agenda

☐ What hyperconvergence is – and what it's not

☐ Why this technology is so popular

☐ Tour of current hyperconverged appliance products

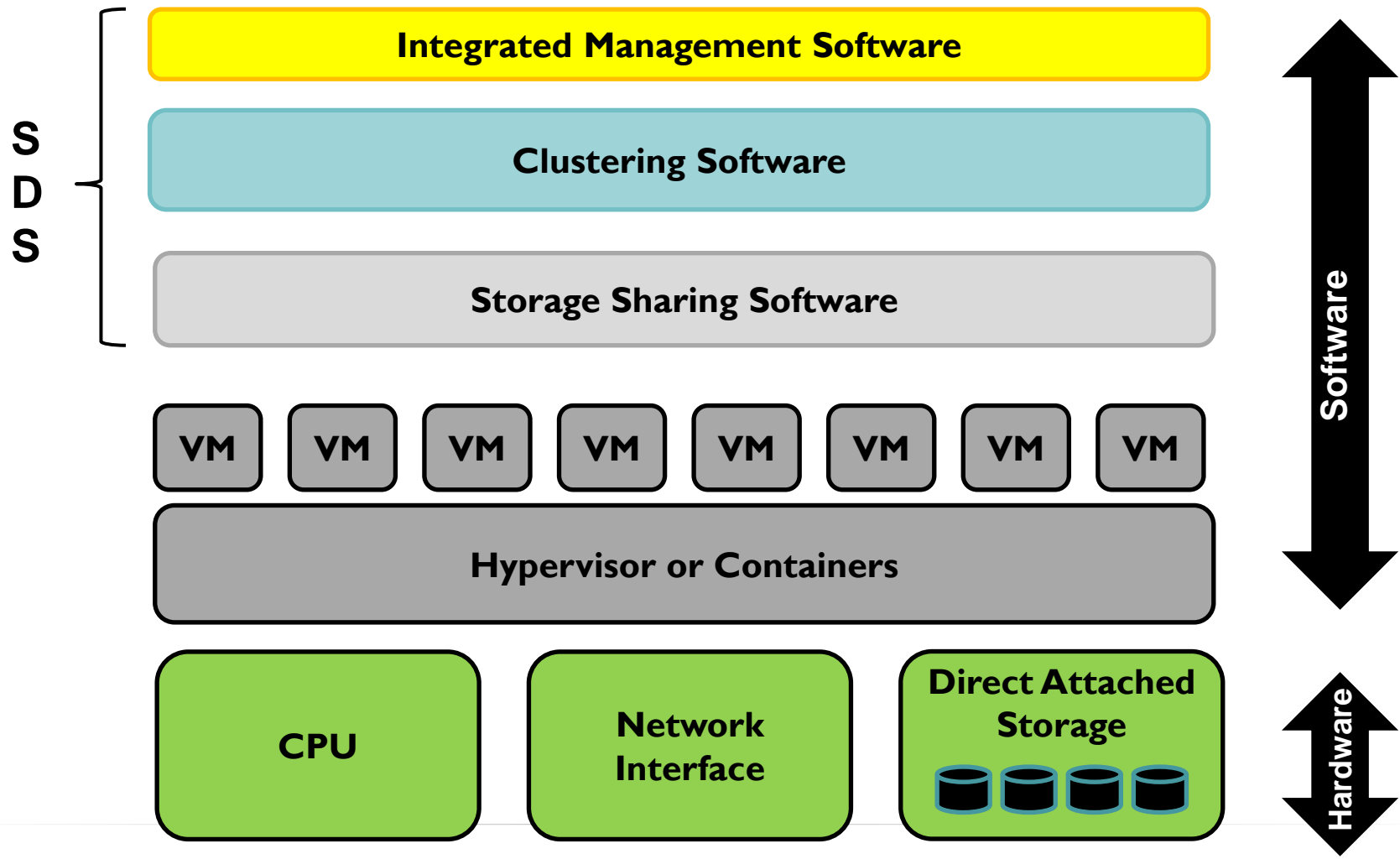☐ Discussion of where this technology and this market is going

What is a Hyperconverged Appliance?

Hyperconverged appliances:

- ❑ combine **compute and storage** resources into
- ❑ **scale-out** platform that
- ❑ includes a **hypervisor** (or containers) and
- ❑ comprehensive **management software**
- ❑ sold by **single vendor** as a
- ❑ cluster of **self-contained appliance modules**
- ❑ running on **industry-standard server hardware** with
- ❑ **internal disk and flash** storage devices.

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Hyperconverged Architecture

S D S

Integrated Management Software
Clustering Software
Storage Sharing Software

VM VM VM VM VM VM VM VM

Hypervisor or Containers

CPU

Network Interface

Direct Attached Storage

Software

Hardware

Where did HCAs come from?

☐ Scale-out storage

☐ Software-Defined Storage (SDS)

☐ Server virtualization

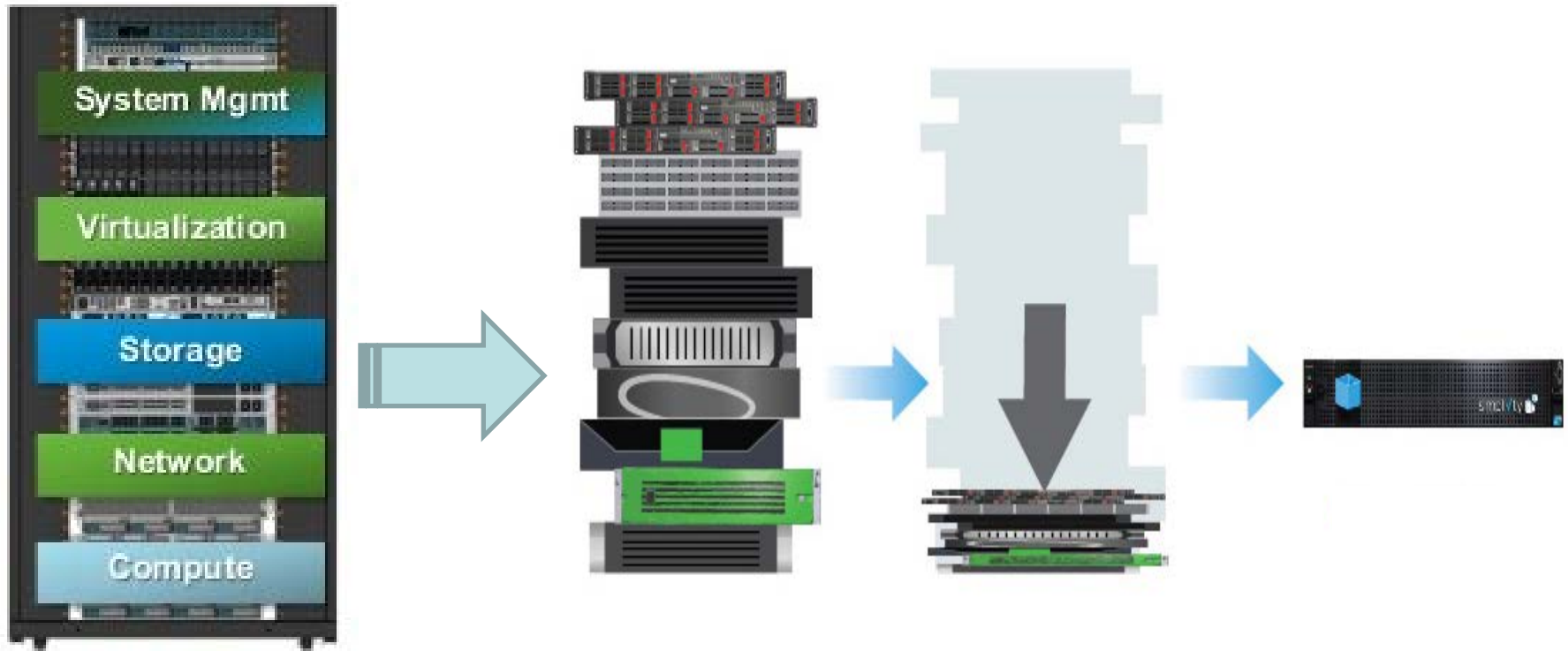☐ Hyper-scale success

☐ Vendor Innovation
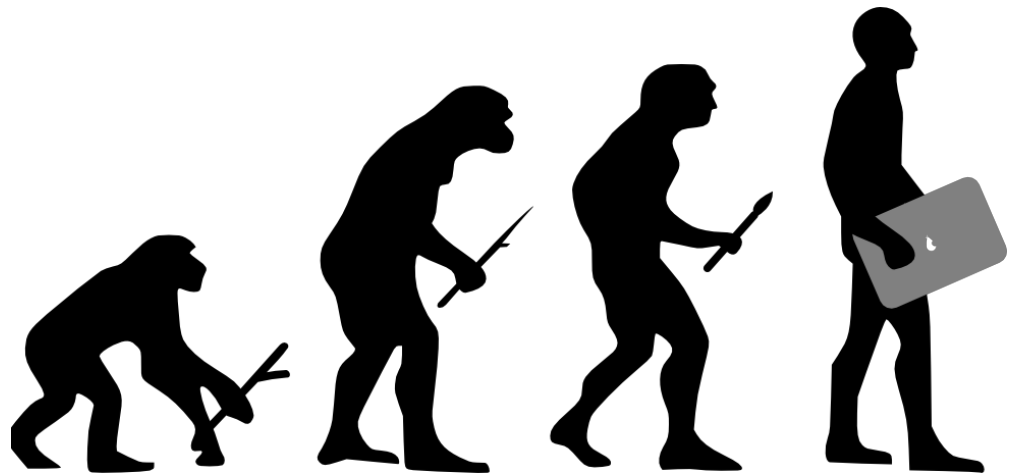
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Converged Infrastructure
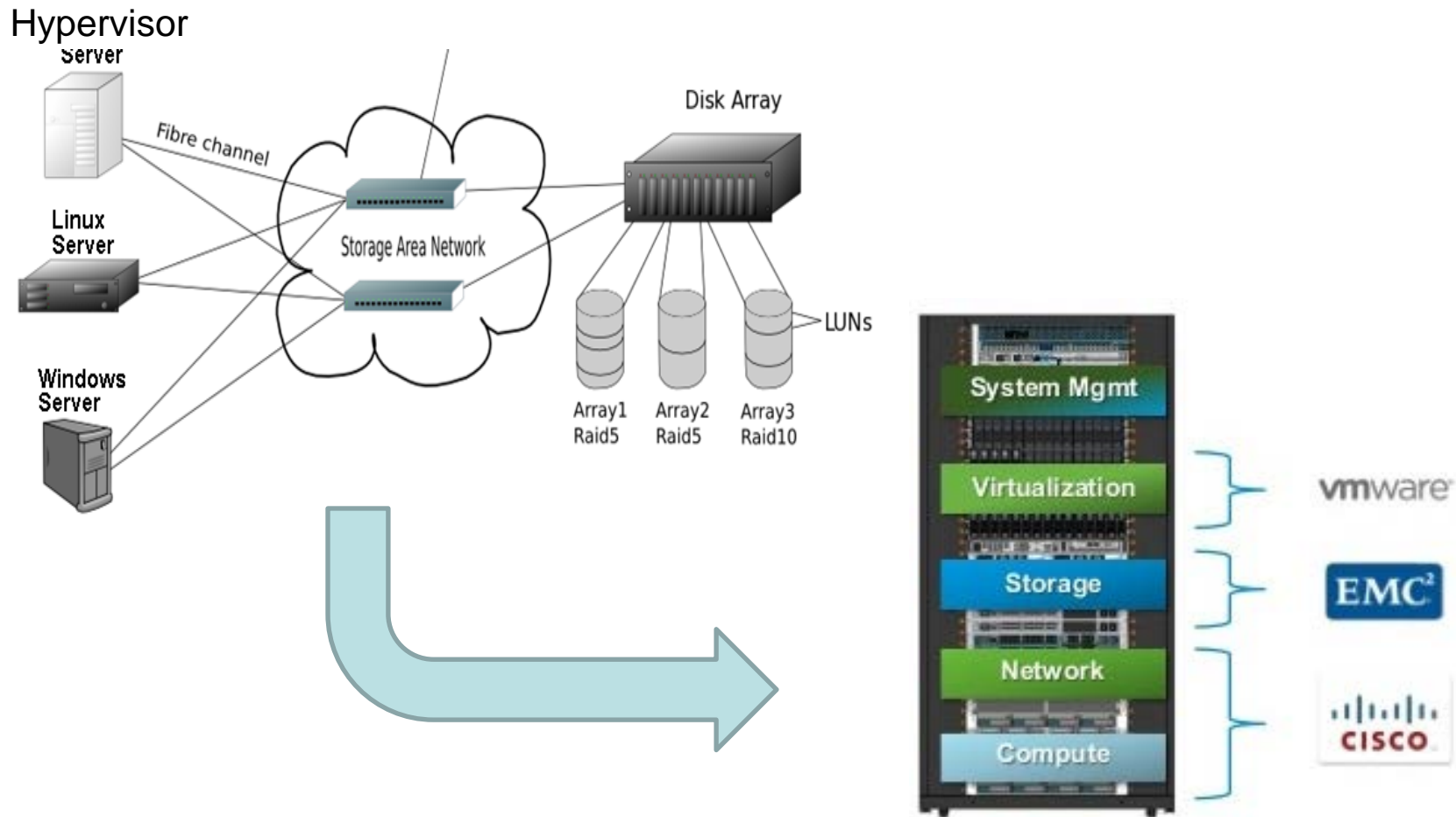
Hyperconverged Infrastructure

Roll-Your-Own

- ☐ Software-only, SDS solutions abound
   - this is component of HCAs
- ☐ Users can create their own HC Infrastructure
- ☐ SDS and industry standard hardware
- ☐ HCA must be turnkey solution from single vendor

Who Cares?

Hyperconverged market growing like crazy

- ❒ $800M in 2015
- ❒ $1.5B by end of 2016
- ❒ $3.9B in 2019

But why?

Source: IDC

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Why is it Successful?

- Supports clouds and cloud-like IT model
- Follows the hyper-scale concept
- Starts small and simple
- Pay as you grow
- Provides a compute platform standard
- Works at the edge
- Commoditizes infrastructure
- Democratizes IT

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Who Makes Hyperconverged Appliances?

- Atlantis HyperScale
- Cisco HyperFlex
- Dell XC series
- EMC/VCE VxRail
- Gridstore Hyperconverged Appliance
- HPE HC 250 / 380
- Maxta MaxDeploy

- Nutanix Xtreme Computing Platform
- Pivot3 Global HCI
- SimpliVity OmniCube/OmniStack
- Scale Computing HC3

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Atlantis Computing - HyperScale

- Founded 2006, Mountain View, CA, HyperScale released in 2015
- Atlantis USX software runs on x86 hardware available from **five OEMs** – **fulfilled by channel partner**
  - Cisco, Dell, HPE, Lenovo, Supermicro (Atlantis badged)
- 4U, 4-node, 1U, single-node chassis available
- 2-node - 64-node max (2-node increments)
- All HyperScale models are **all-flash (no hybrid)**
- Up to 4 SSDs per node (16 per 4-node appliance)

Atlantis HyperScale - Software

- HyperScale runs **Atlantis USX software** as VM
    - VMware, XenServer
- USX leverages distributed file system to provide abstraction layer between nodes
    - USX ILIO is SDS caching product released in 2014
- **In-line DRAM and flash-based dedupe and compression** are at foundation
- Single- and double-parity RAID data protection between nodes
- Integrated with VMware vCenter

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Cisco HyperFlex

- Cisco released HyperFlex HCA line in **Mar 2016**
- Product uses Cisco's UCS X86-based server platform
- 1U and 2U, Single-node hybrid models available
- 3-node minimum, 16-node max
- Nodes incorporate **UCS fabric interconnects**
- Compute-only expansion by **connecting UCS servers**
- 1U HX220c - 6 HDDs, 1 SSD
- 2U HX240c - 23 HDDs, 1 SSD

HX240c M4
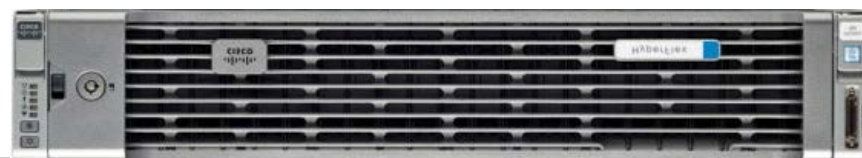
Cisco HyperFlex - Software

- HyperFlex HX Data Platform runs **software licensed from SpringPath** as VM on Vmware hypervisor
- **Log-structured, distributed file system** abstraction layer
- Incoming data is synchronously mirrored and striped data across cluster
- Integrated with vCenter for VM management
- UCS Manager for storage and server profiles
- Enables connection of compute-only UCS servers
- **Always-on dedupe** and compression

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Dell XC Series

- Dell XC Hyperconverged appliance line announced 2014
- Uses **Nutanix software** running on Dell x86 server
  - VM on VMware, Hyper-V and KVM
- 1U and 2U single- and 4-node HCA - hybrid and all-flash
- 2U hybrid **storage-only node**
- Dell XC clusters 3 nodes min - no specified max
- Single-node - up to 24 HDDs, 10 SSDs
- 2U, storage-only nodes
  - 12 HDDs, 2 SSDs

EMC VxRail

- Released by EMC's VCE division in **Feb 2016**
- Replaces VSpex Blue and EVO:Rail HCAs
- 2U, 4-node appliance module (Dell OEM)
- VxRail clusters can contain between 4 and 64 nodes
- Four hybrid models 5 HDDs, 1 SSDs per node
- **Five all-flash** models - **6 SSDs per node**
- **Scales** by adding appliances - **4 nodes at a time**

VxRail - Software

- **VSAN software** runs on each node, creates virtual SAN across nodes
- **Embedded in VMware kernel**, not running as guest VM as other HCAs do
  - VMware claims this improves performance
- VSAN 6.2 offers single- or dual-parity RAID distributing data blocks between nodes
- In-line dedupe and compression
- VSAN integrated with VMware management tools

Gridstore Hyperconverged Appliance

- Founded 2009, Mountain View, CA, **HCA released 2015**
- 2U, 4-node hyperconverged appliance
- Clusters contain a **min of 3 and a max of 256** nodes
- **Mix/match 3 compute-node** configs and **storage node**
  - Up to 24 SSDs per 4-node appliance
- 1U, single-node, hybrid, **storage-only appliance**
  - Up to 12 HDDs and 1 PCIe SSD per appliance

Gridstore HCA - Software

- HCA software is **built on Gridstore's SDS** scale-out storage solution
- **Runs in Windows kernel** (not VM) – ind. of hypervisor
- Internal data protection with **inline erasure coding**
  - 50% less resources consumed - company claim
- HCA **connect to external** Gridstore **SDS** system
- Leverages features resident in Windows Server 2012 OS
- Includes Hyper-V – only hypervisor choice
- Integrated with Windows management (MS Systems Center)

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HPE Hyperconverged 250 / 380

- First Hyperconverged Appliance product released 2014
- **HC 380 is 2U, single-node** chassis that uses HPE ProLiant DL380 server
- **HC 250 is 2U, 4-node** model
- **2 node cluster –** scales to 16-node single resource pool
- HC 250: 6 HDDs, 2 SSDs per node
- HC 380: **3 storage blocks** in single-node chassis
  - 6 HDDs + 2SSDs (hybrid block)
  - 8 HDDs each (HDD block)

HPE HC 250 / 380 - Software

- HPE's **StoreVirtual VSA SDS** runs as VM on each node
  - VMware, Hyper-V, KVM hypervisors
- Network RAID stripes multiple copies across nodes
- **Connects to external StoreVirtual appliance** or cluster
  - SDS storage-only nodes
- Connects to external servers
  - compute-only nodes
- **HC 380 UI** automates firmware upgrades, simplifies deployment of VMs
  - UI not integrated with VMware

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Maxta MaxDeploy

- Founded 2009, HQ Sunnyvale, CA, first release 2013
- MaxDeploy **HCAs configured on Maxta website**
  - **6 OEMs** – delivered thru channel partners
    - Dell, HP, Intel, Lenovo, Quanta, Supermicro
- 3-node minimum cluster, no specified maximum
- 2U, 4-node appliance - 24 HDDs and 8 SSDs
- 1U, single-node appliance - 6 HDDs, 2 SSDs
- **Storage expansion options**:

MaxDeploy on Intel

  - Direct connected storage (DAS)
  - Upgrading drive capacity

Maxta MaxDeploy - Software

- MxSP SDS runs as VM on VMware or KVM – or on Linux
- '**Hardware agnostic' design** (Maxta claim)
  - Multiple platforms, storage and server flexibility
- Maxta Distributed File System provides VM-based abstraction layer
- **All functionality at VM level** - provisioning, protection, data services, management
- Replicate and stripe data across cluster – at VM level
- Asynchronous replication - local and remote
- Synchronous replication (stretch clustering)

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Nutanix - Xtreme Computing Platform

- Founded 2009, San Jose, CA, **first release 2011**
- 2U appliances **1-, 2- or 4-node models** (Supermicro)
- Nutanix sells software to other OEMs (Dell, Lenovo)
- Nutanix clusters start at 3 nodes with no specified max
- NX Series **10 models** – hybrid, one AF
- Up to 20 HDDs, 8 SSDs, 24 SSDs per AF node

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Nutanix – Software

- Acropolis software runs as VM on each node
  - **VMware, Hyper-V, KVM (proprietary**)
- Distributed Storage Fabric (DSF) - abstraction layer
  - Based on **Google File System**
- DSF synchronously replicates writes to other nodes
- Acropolis **App Mobility Fabric** – VM migration layer
- Timestream - VM-centric snapshot-based BU
- Manage with Prism, vCenter, MS Systems Center plugin

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Pivot3 – Global Hyper-Converged Infras.

- Founded **2003**, HQ Austin, TX, first release GHCI **appliance 2014**
- Originally, scale-out storage for video surveillance
- Pivot3 GHCI 2U, 1- or 4-node appliances (Dell h/w)
  - Lenovo, Cisco OEM
- 3 to 16 node clusters – **single node operation**
- 2U, single- or 4-node appliances
- Hybrid models - 12 HDDs, 2 SSDs
- **All-flash** models - 8 SSDs
- **Storage-only nodes**
  - 12 HDDs, 2 SSDs

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Pivot3 GHCI - Software

- vSTAC abstraction layer, runs as VM (VMware only)
- GHCI uses **erasure coding** to provide internal data protection
- **More efficient** than replicating copies – claim 7% overhead, 94% usable capacity
- Resilient, **variable parity**-based scheme distributes data around cluster
- Protects against 5 drive failures or 2 drives and appliance failure
- PC-based vSTAC Manager runs on external PC

Scale Computing – HC3

- Founded in 2007, Indianapolis, IN, first scale-out storage product 2009, **first HCA in 2012**

- HC3 is 1U, single node appliance (Supermicro and Dell)

- 3 – 8 nodes max or to 16 with Scale tech support

- 3 HC3 original models - **all-HDD** configurations

- 2 new **hybrid models** – field upgrade HDD to hybrid

- Current models feature up to 8 HDDs and 2 SSDs

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Scale Computing - Software

- HyperCore **software runs at Linux kernel** level, not VM
  - **Only** supports the **Scale proprietary KVM** hypervisor
- SCRIBE data placement engine handles abstraction, data sharing and data protection functions
- Creates replica (up to 16) of each block in VM and distributes around cluster, like distributed RAID 10
- **Automated data tiering** supported between SSD and HDDs – not caching
  - Can also pin data in flash or in HDDs
- Web-based management tool runs on any node
- **DRaaS** offering for Cloud DR

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SimpliVity - OmniCube

- Founded in 2009, Westborough, MA, **release in 2012**
- 2U appliance, single-node model - current Dell OEM
- SimpliVity OmniStack software available through:
  - OmniStack with Cisco UCS, Lenovo System
- OmniCube **can run as a single node** (2 recommended)
- Scales to 32 nodes (rec max) – no formal limit
- 4 models - up to 20 HDDs, 4 SSDs (caching) per node
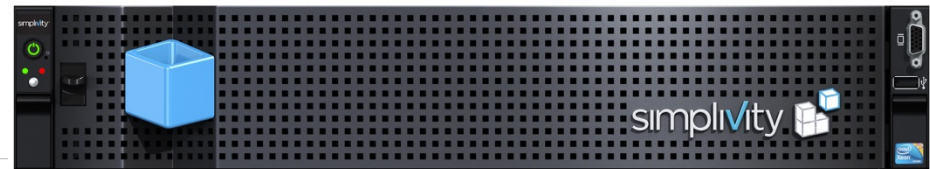
SimpliVity – Hardware / Software

- Proprietary **PCIe accel card** – dedupe, compression
- OmniStack runs as VM - on **VMware, XenServer and KVM**
- **Data Virtualization Platform** (DVP) – abstraction layer
  - Mirrors data blocks and distributes around cluster
  - Manages block deletion to **eliminate clones**
- **RAID 5** or 6/60 within each node
- **Built-in VM-level backup** and restores
- Single pane of glass control, plus vCenter plugin

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Hyperconverged Appliances Today

Historically sold into

- SMB and medium-sized companies
    - Primary infrastructure
    - Replacing SAN, NAS and servers
- Enterprise
    - ROBO, Departmental, Specific projects
    - – VDI, Test and Dev
- HCAs closing in on mainstream Enterprise

Hyperconverged Appliances Tomorrow

□ Flash, flash and more flash

    □ – incl. all-flash nodes

□ Smaller starting configurations

□ More VM-level functionality

□ Storage-heavy nodes

□ Compute-heavy node

□ More features

Hyperconverged Market Tomorrow

HCAs will continue to expand in mid-market and SMB space

Enterprise IT is warming up to HCAs

Enterprise Vendors adding HCAs
- EMC VxRail
- Cisco HyperFlex
- HPE HC 250/380
- HDS, NetApp and IBM?

HCA in the Enterprise Survey – Where

Hyperconverged Infrastructures in Enterprise

- ❑ Consolidation of traditional infrastructure
- ❑ Virtual Server projects
- ❑ VDI

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HCA in the Enterprise Survey – What

Enterprise IT prefers enterprise suppliers

 - and VMware

VSAN	64%
VxRail	44%
Nutanix	42%
HPE	27%
Dell	21%
SimpliVity	17%
All others	single digits

Thank you

Questions?

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