



SDC 18

September 24-27, 2018
Santa Clara, CA

www.storagedeveloper.org

Hyper Converged and Converged Storage Platforms for ERP

Bhasker Ravikanti
Honeywell

Agenda

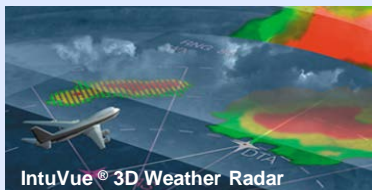
- ❑ Introduction
- ❑ ERP systems @ Honeywell
- ❑ Storage @ Honeywell
- ❑ New Data Center Transformation (SAN Free) – Private Cloud
 - ❑ Hyper Converged Platform
 - ❑ Converged Platform
- ❑ Conclusion

Honeywell Overview

NYSE: HON | ~1,300 sites | ~131,000 employees | Morris Plains, N.J. headquarters | Fortune 100

Aerospace

\$14.8B
Sales



IntuVue® 3D Weather Radar

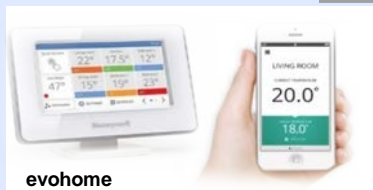
Unmatched Scope of Offerings

- Mechanical, Cockpit, and Software Offerings From Nose to Tail
- Apps, Services, Maintenance, Subscriptions
- End-to-End Connectivity Solutions From Hardware to Airtime
- Turbochargers for Fuel Efficiency

Reflects 2016 Full Year Results

Home and Building Technologies

\$10.7B
Sales



evohome

Connecting Homes and Buildings

- Security and Fire
- Connecting Homes With Lyric™
- Open Software Connecting “Internet Of Things” in Buildings

Performance Materials and Technologies

\$9.3B
Sales



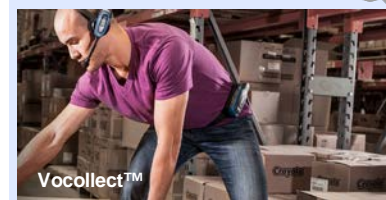
Experion® Orion Console

Winning Technology

- Refining and Petrochemical Catalysts
- Gas Processing Modular Offerings
- Solstice® LGWP Materials
- SmartLine Transmitters
- Asset Optimization Software

Safety and Productivity Solutions

\$4.6B
Sales



Vocollect™

Connecting Workers

- Wireless, Voice, Mobility, Data Analytic Solutions for Workers
- Warehouse Automation
- Keeping Workers Safe

Honeywell

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Honeywell is building a smarter, safer,
and more sustainable world.

THAT'S THE POWER OF **CONNECTED**.
THAT'S THE POWER OF **HONEYWELL**.

Connected Aircraft | Connected Automobile | Connected Home | Connected Building
Connected Plant | Connected Supply Chain | Connected Worker

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Honeywell Spin Offs

We lead the development of innovative and differentiated solutions which empower the transportation industry to redefine and further advance motion.

Garrett
ADVANCING MOTION



Turbochargers



Electric Boosting



Automotive Software

resideo

Honeywell Home

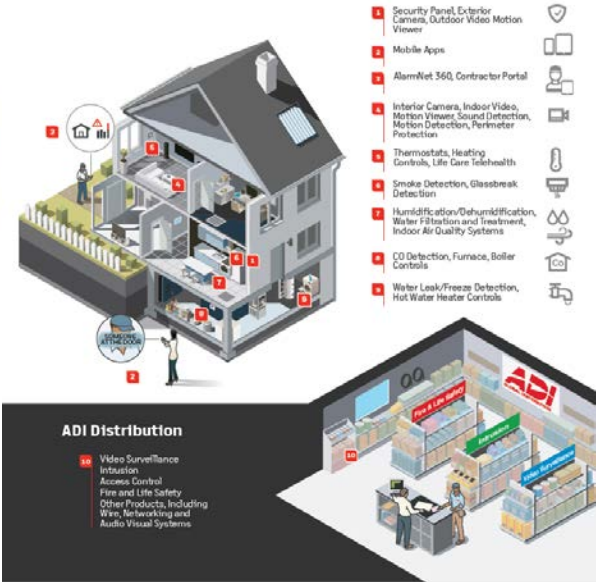


WHAT WE DO

Honeywell Home

Our broad portfolio provides **innovative, end-to-end solutions** across Comfort and Care and Security and Safety for the home, solving multiple customer needs. Our growing portfolio of connected home solutions is one of the largest and most comprehensive in the market.

resideo



- 1 Security Panel, Exterior Camera, Outdoor Video Motion Viewer
- 2 Mobile Apps
- 3 AlarmNet 360, Contractor Portal
- 4 Interior Camera, Indoor Video, Motion Viewer, Sound Detection, Motion Detection, Perimeter Protection
- 5 Thermostats, Heating Controls, Life Care Telehealth
- 6 Smoke Detection, Glassbreak Detection
- 7 Humidification/Dehumidification, Water Filtration and Treatment, Indoor Air Quality Systems
- 8 CO Detection, Furnace, Boiler Controls
- 9 Water Leak/Freeze Detection, Hot Water Heater Controls

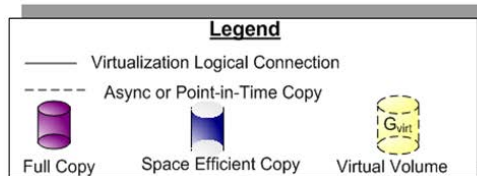
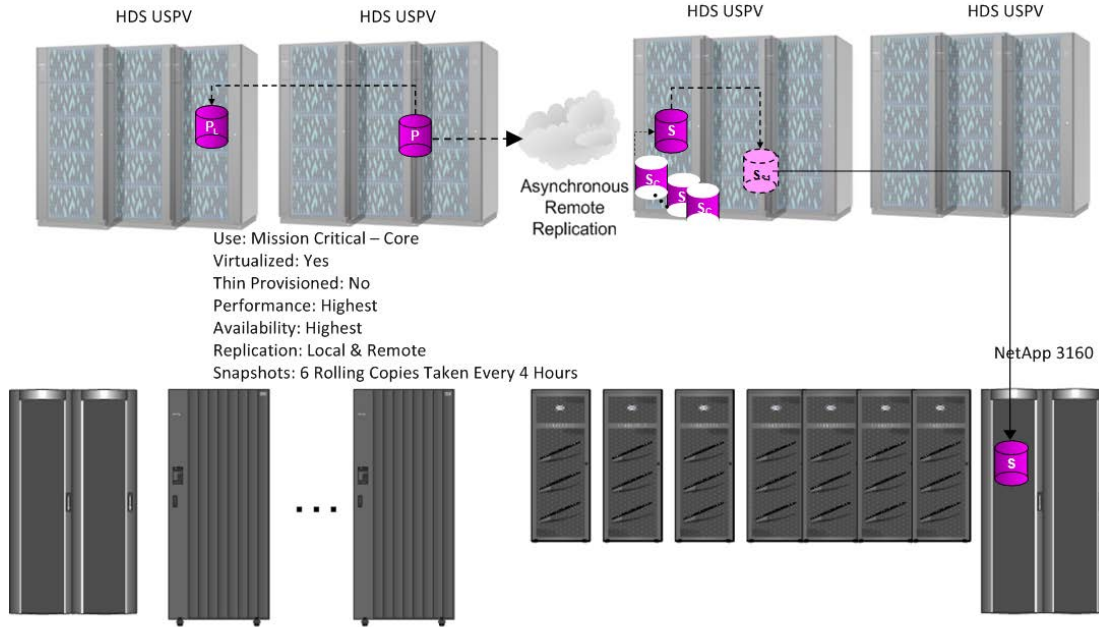
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ERP systems at Honeywell

- ❑ Primary ERP: SAP
 - ❑ 180 systems.
 - ❑ Global Users.
 - ❑ Very Large Storage Footprint. Few databases in 40~60 TB range.
- ❑ Other ERP:
 - ❑ Oracle
 - ❑ People Soft

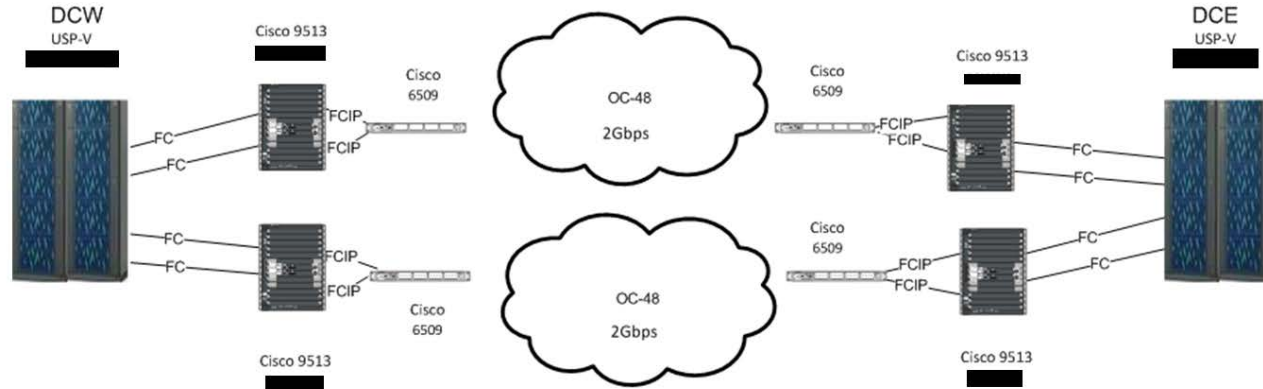
SAP on SAN Storage - Hitachi



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SAP DR Replication Architecture - Hitachi

Honeywell Replication Infrastructure
Hitachi Universal Replicator (HUR)
11/1/2010



SAP on Preconfigured Platform- VCE

**VBLOCK = Cisco UCS Compute +
Cisco Network + EMC Storage +
VMWare**



**VMWare – 528 cores x 14336 GB RAM
Physical – 120 cores x 6 TB RAM
Storage – 178 TB**

**VMWare – 468 cores x 12288 GB RAM
Physical – 120 cores x 4 TB RAM
Storage – 263 TB**

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Performance Characteristics

❑ Metrics

- ❑ db file sequential read
- ❑ log file sync
- ❑ IOPS

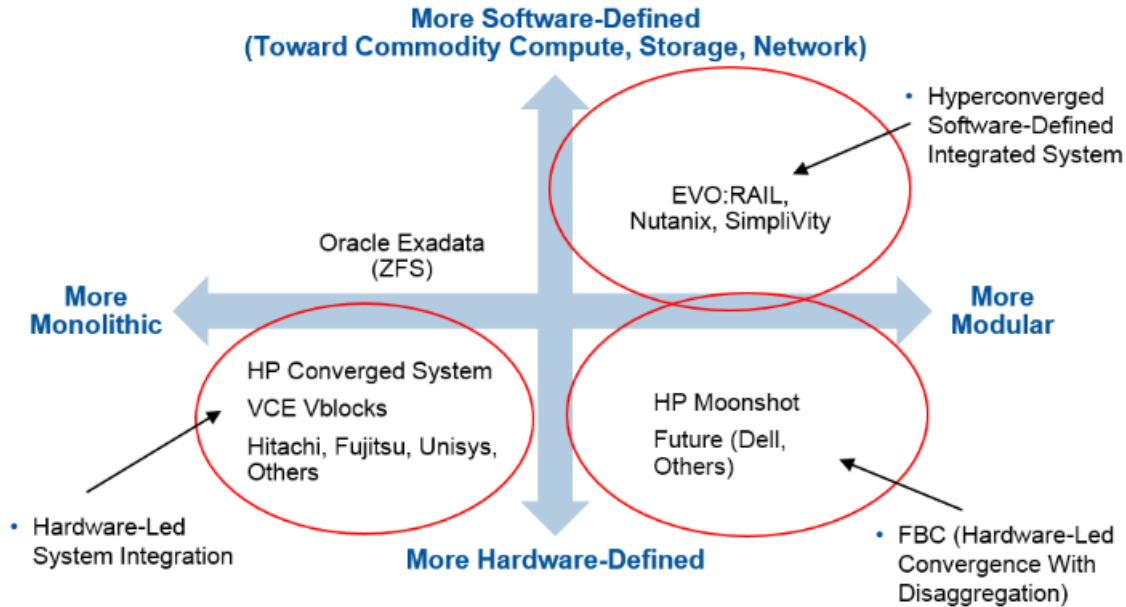
❑ Factors

- ❑ Batch Jobs
- ❑ Data Warehouse ETL
- ❑ End Users
- ❑ 1 GB Network

New Data Center Transformation

- ❑ Primary Data Center is 25 years old
- ❑ Majority physical servers with SAN storage
- ❑ 1 GB Network connectivity (with few exceptions)
- ❑ Secondary Data Center is less than 10 years old but was modeled after the primary data center
- ❑ New Data Center: Designed for a private cloud with technology modernization in the areas of network (40 GB to 100 GB backbone), storage and scalable infrastructure.
- ❑ Similar design in both primary and secondary locations.

Hyper Converged Platform



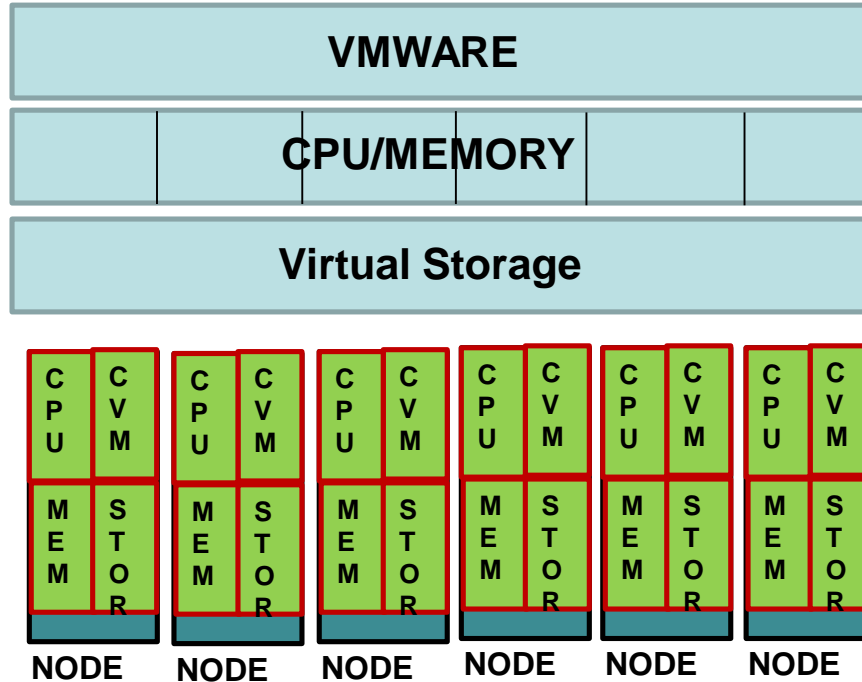
Source: Gartner (May 2015)

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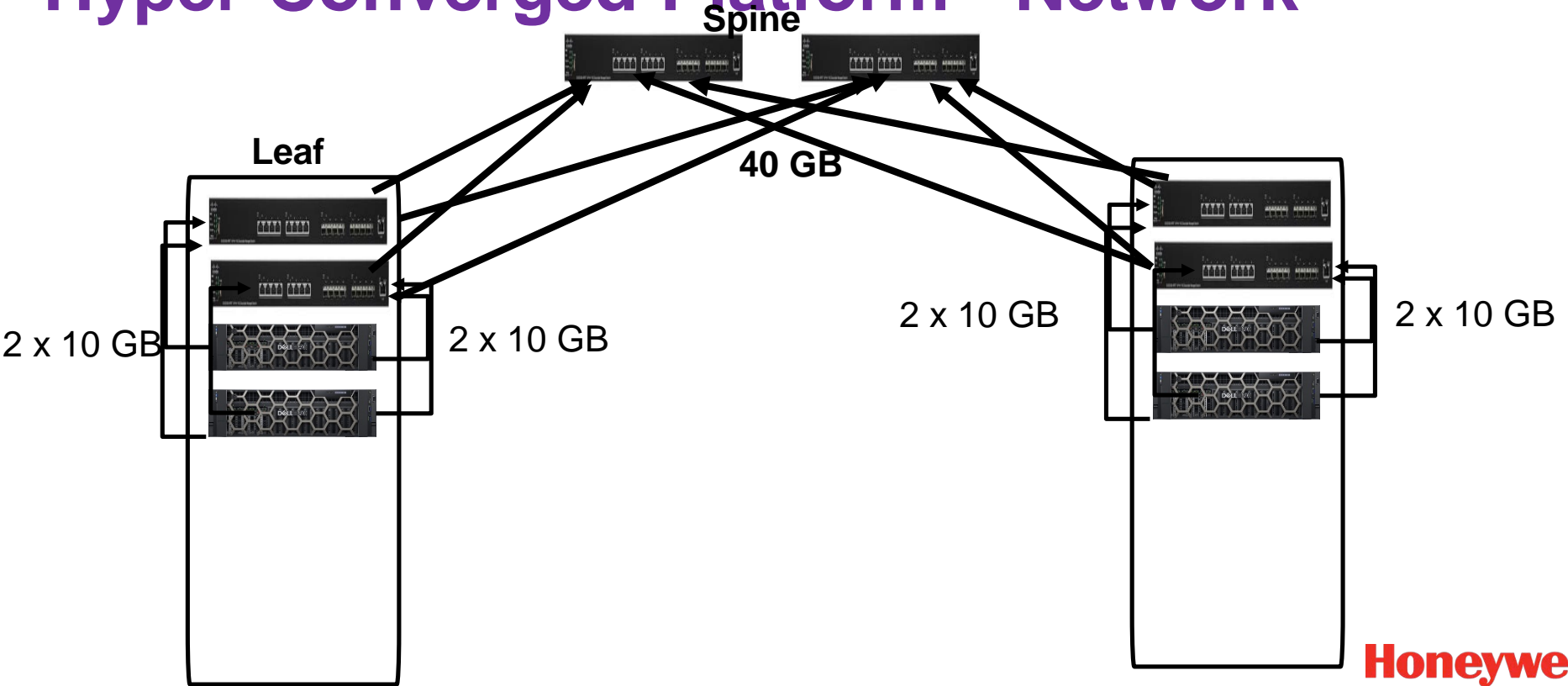
Hyper Converged Platform

- ❑ Flash Nodes – Dell Nutanix XC630
 - ❑ CPU: 2 x 14 cores
 - ❑ Memory: 1.5 TB
 - ❑ SSD: 10 x 1.6 TB
- ❑ Hybrid Nodes – Dell Nutanix XC730XD
 - ❑ CPU: 2 x 14 cores
 - ❑ Memory: 1.5 TB
 - ❑ SSD: 4 x 1.6 TB
 - ❑ Hard Drive: 20 x 2 TB

Hyper Converged Platform - Overview



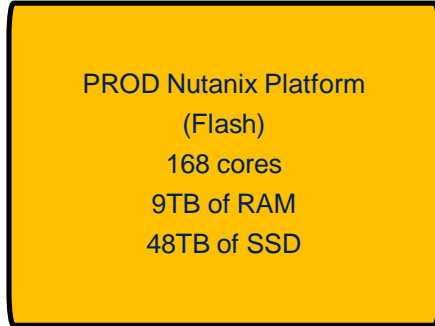
Hyper Converged Platform - Network



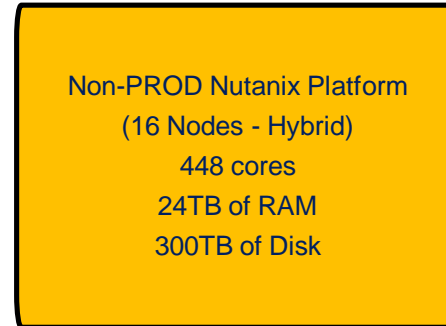
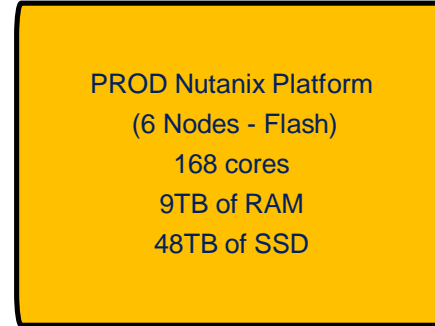
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Hyper Converged Platform1 - Capacity

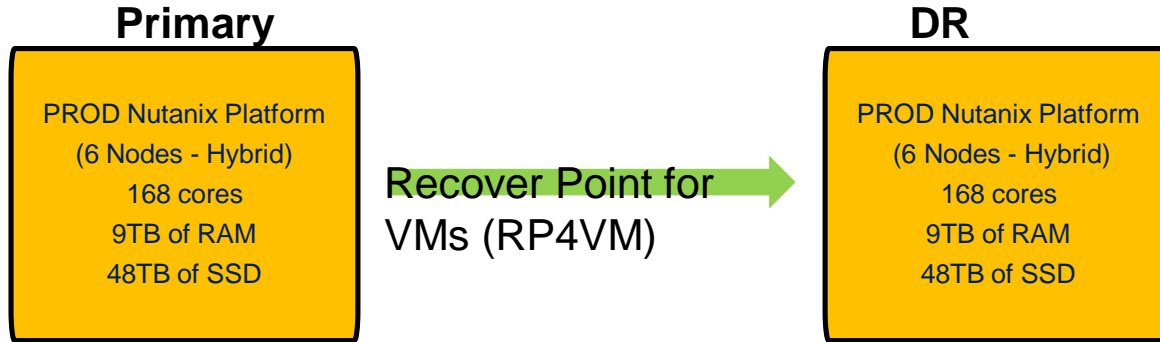
DR



Primary



Hyper Converged Platform2 - Capacity



Hyper Converged Platform - Benefits

- ❑ Performance for work loads that fit a single node (<16TB for nodes with SSD).
- ❑ Compression at the storage level (good for databases).
- ❑ Deduplication at the storage level (good for application servers).
- ❑ Free Acropolis hypervisor (no need to use VMWare) that is fully supported by SAP.
- ❑ Replication for DR possible without additional software or tools.
- ❑ Proactive detection of h/w failures.

Hyper Converged Platform - Limitations

- ❑ Compute and Memory limitations due to having only 2 CPUs.
- ❑ Performance bottlenecks if the work load requires storage that doesn't fit a single node.
- ❑ Adding storage or compute or memory requires adding a node with all three components (storage only nodes have been introduced recently).

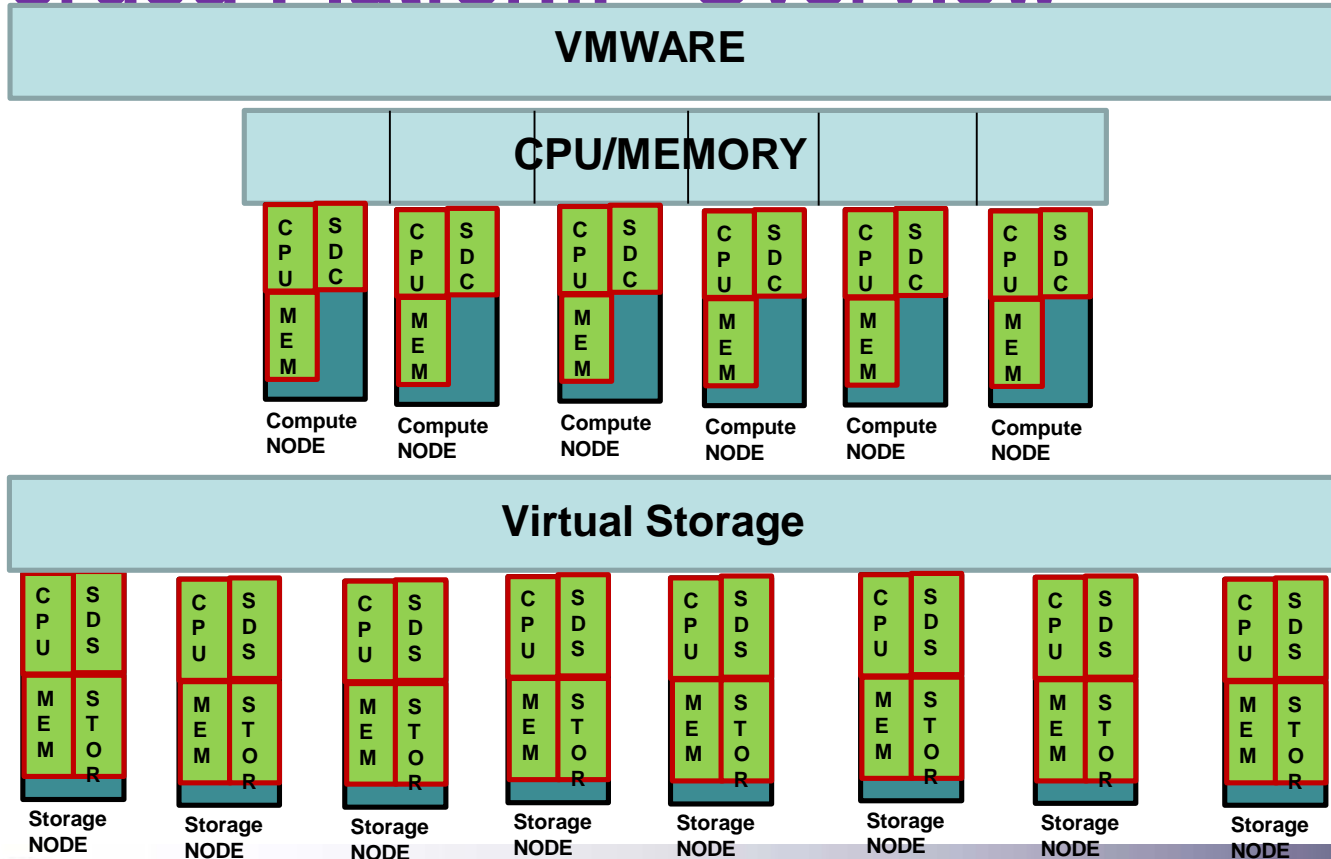
Converged Platform - Storage

- ❑ Flash Nodes – Dell ScaleIO Ready Node R640
 - ❑ CPU: 2 x 12 cores
 - ❑ Memory: 96 GB
 - ❑ SSD: 10 x 1.92 TB
- ❑ Hybrid Nodes – Dell ScaleIO Ready Node R740XD
 - ❑ CPU: 1 x 12 cores
 - ❑ Memory: 192 GB
 - ❑ SSD: 2 x 1.92 TB
 - ❑ Hard Drive: 22 x 2.4 TB

Converged Platform - Compute

- ❑ Dell R940
 - ❑ CPU: 4 x 24 cores
 - ❑ Memory: 3 TB

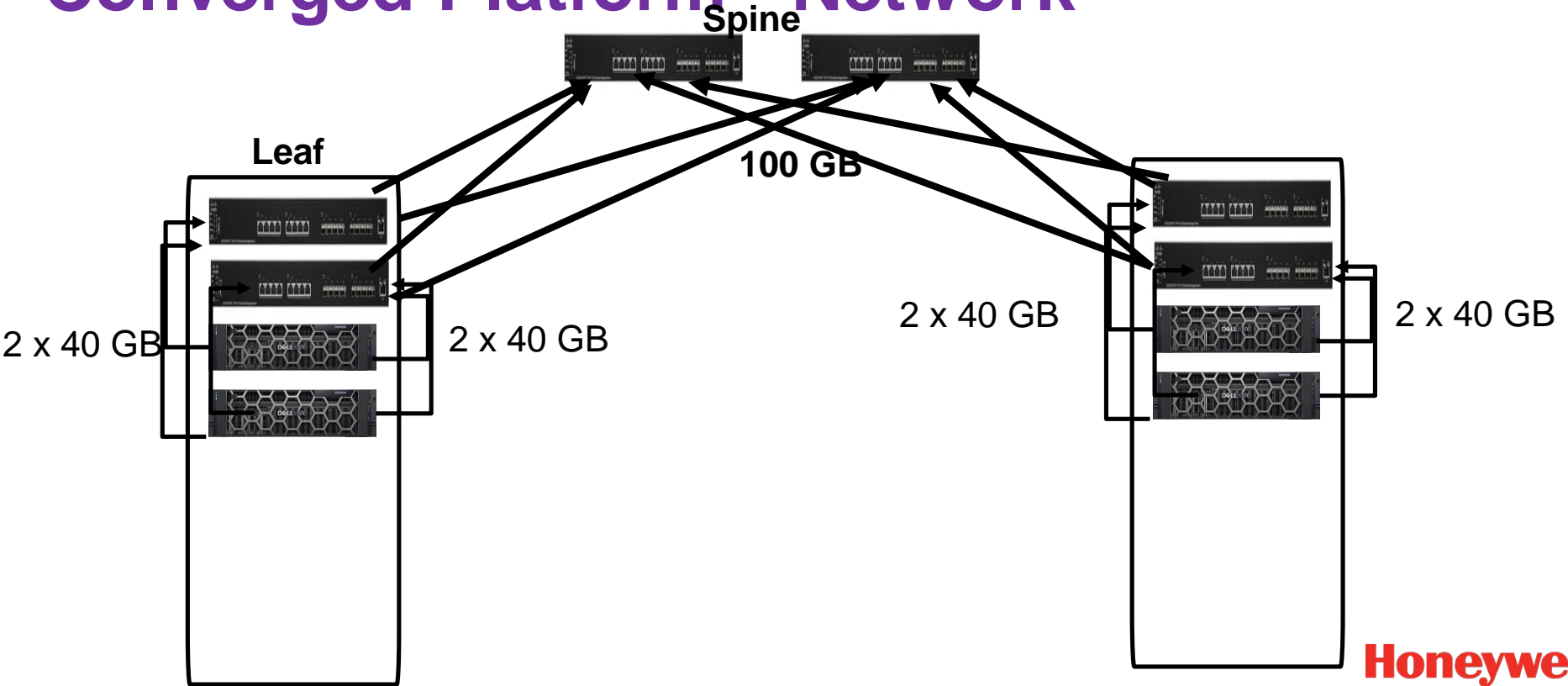
Converged Platform - Overview



MDM

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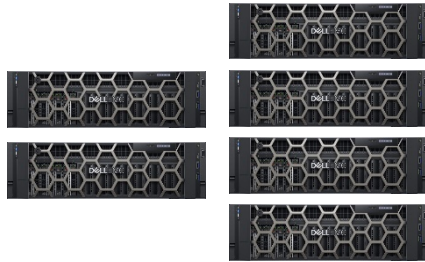
Converged Platform - Network



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Converged Platform1 - Capacity

DR



Dell-EMC Compute
576 cores
18 TB of RAM

Primary



Dell-EMC Compute
1024 cores
36 TB of RAM

Dell-EMC Storage
411TB of SSD (53 Nodes)
144TB of Hybrid (8 Nodes)

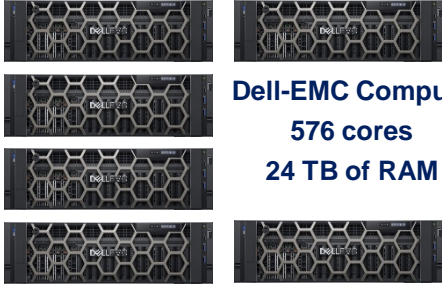
← Recover Point for
VMs (RP4VM)

Dell-EMC Storage
361TB of SSD (46 Nodes)
612TB of Hybrid (32 Nodes)

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Converged Platform2 - Capacity

Primary

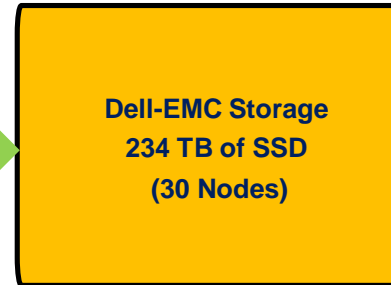
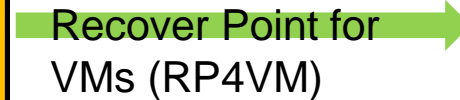
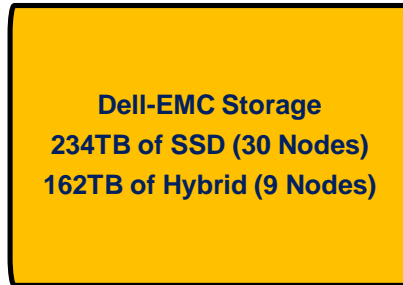


Dell-EMC Compute
576 cores
24 TB of RAM

DR



Dell-EMC Compute
384 cores
12 TB of RAM



Converged Platform - Benefits

- ❑ Independently scalable Compute and Storage.
- ❑ Performance is also scalable by addition of nodes.
- ❑ Dynamically add and remove nodes.
- ❑ Automatic rebalance when nodes are added or removed.

Converged Platform - Limitations

- ❑ Compression and deduplication features not available yet.
- ❑ Additional features offered by the platform not available through VMWare hypervisor (storage snapshots for example).
- ❑ Single storage pool has a limit of 512 volumes.

Conclusion

- ❑ Smaller work-loads benefit from Hyper Converged Platforms
- ❑ Larger work-loads require Converged Platform to manage the performance characteristics.
- ❑ Cost comparison between the two: Depends on workload size.