Data Drives Tremendous Opportunity

IT can get really complicated
Hybrid Cloud is the Preferred Enterprise Strategy

Source: RightScale 2018 State of the Cloud Report
#1. A Common Operational Model Simplifies Hybrid Cloud

- **Consistent Infrastructure**: VM Infrastructure / Container Infrastructure
- **Consistent Operations**: Automation and Operations / Across Clouds
- **Consumable Developer Experience**

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Enterprise Infrastructure Pain Points are the Storage Pain Points

- High Cost of Storage
- Capacity Planning/Forecasting
- Dealing with Growth

Source: 451 Research, Voice of the Enterprise, Compute Infrastructure, 2019

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#2: Modernization of the Data Center Is Being Fueled by Full-Stack HCI

Traditional 3-Tiered Architecture
Complex and Separate Silos

- Virtualization
  - Servers and Blades
  - External Storage
  - Networking Hardware

Virtualization
Private Cloud
Public Cloud
Edge

VMware Cloud Foundation

- VMware Cloud Foundation
  - Automation & Operations
  - Unified Management
  - Compute Virtualization
  - Storage Virtualization
  - Network Virtualization
  - Intrinsic Security & Lifecycle Automation

Lower TCO, Simplified Management, Greater Agility & Scale

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A Massive Shift to HCI Spend

Storage Market Segmentation

Source: IDC Converged Systems Tracker Forecast, Q4 2018, Published April 2019
IDC WorldWide and U.S. Enterprise Storage Systems Forecast 2019-2023, IDC. Published May 2019
HCI Capturing Increased Share of Workloads

Source: 451 Research, Voice of the Enterprise, Compute Infrastructure, 2019

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#3 PMEM - HW Technology Driving Application Innovation

Developers can now make memory trade-offs to optimize apps; realize new capabilities

- **Large Capacity Memory**  
  server consolidation for memory bound apps

- **Faster DB**  
  with low-cost, large capacity Memory  
  Keep data in-memory, avoid write to disk

- **Faster reboot of Apps**  
  with low-latency Persistent Storage

- **Faster HA restarts**  
  1000x lower latency than SDD  
  4 mins w. PMem vs 50 mins w. SSD

- **Improved Real-time processing**  
  Byte-addressable Persistent Memory

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**Trade-offs – Speed, Non-Volatility, Cost**

- **DRAM**  
  Super-Fast  
  Volatile  
  Expensive

- **PMEM**  
  Fast  
  Non-volatile  
  Relatively inexpensive

- **Flash**  
  Slow  
  Non-volatile  
  Inexpensive
#4 Disaggregation being fueled by workloads requiring different ratio of Compute & Storage

Workload Examples: Data warehouse, Search engine databases, Log aggregation, Analytics

**Hardware Based Disaggregation**

**Composable Infrastructure**
Different Ratios of Compute Blades + Storage Modules

**Software based Disaggregation**

- **Storage shared across multiple clients: proprietary HCI protocol**

- **Storage only Nodes (denser storage)**

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HCI with NVMeOF Delivering Scale and Performance

- Retain the simplicity of HCI management for provisioning and disaggregation workflows
- Eliminate performance vs. capacity imbalance
- Scale storage and compute independently for improved utilization of infrastructure resources

Compute Only ESXi Nodes

NVMe-oF
RDMA Over Converged Ethernet (RoCE)

Storage – All NVMe JBOF

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Thank You

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