Make hybrid cloud easy with Azure Stack HCI and 2nd Generation Intel Xeon Scalable Processors

Todd Christ, Intel
Trends in the IT industry

HYPERCONVERGED INFRASTRUCTURE (HCI)

HCI brings together compute, storage, and networking to provide greater performance and scale while reducing infrastructure costs\(^1\)

APPLICATION INNOVATION

Use of containers and tools is up, as more enterprises adopt the technology for consistent and flexible apps across environments\(^2\)

HYBRID CLOUD

Enterprises see themselves operating hybrid clouds for the foreseeable future\(^3\)

Source: 1-Microsoft study, 2017; 2-“forecast: information security, worldwide, 2015-2021, 3Q17 update,” Gartner; 3-right scale 2016 state of the cloud report
TOP REASONS CUSTOMERS ARE GOING CLOUD

- Meet the needs of users, teams, and business
- Speed up software development
- Back up data
- Utilize remote services
- Reduce data center footprint
- A broader range of environments, tools, and services

Source: Forrester opportunity snapshot
End of support Deadlines

SQL Server 2008 and 2008 R2

- Extended Support Ends July 9, 2019

Windows Server 2008 and 2008 R2

- Extended Support Ends January 14, 2020

Find lifecycle support deadlines at: support.microsoft.com/lifecycle
Traditional Infrastructure

Hyperconverged Infrastructure (HCI)
Software by Microsoft Windows Server* Datacenter +
Hardware Architecture by Intel® Xeon® Scalable Platforms

Ethernet switches
- Intel x86 servers
  + Local Intel® SSD, NVMe, and Intel® Optane™ DC persistent memory
  + Powerful Microsoft HCI software to pool resources

Hypervisors

Misc. appliances

Storage fabric

Storage (SAN)
Customer scenarios -> Azure Stack HCI solutions

- STORAGE
- REMOTE OFFICE
- BRANCH OFFICE
- BUSINESS-CRITICAL INFRASTRUCTURE
- CONSOLIDATION
- VIRTUAL DESKTOP INFRASTRUCTURE
Upgrade for Best Performance and Security

8 year Old Server + Windows Server 2008 R2 vs. 2nd Gen Intel® Xeon® Scalable Platform + Windows Server 2019

### Compute
- **7X number of cores**
  - 2 sockets/28 cores (56 cores total)
  - Accelerate Compute-Intensive Workloads with Intel® AVX-512, AES-NI, DL Boost

### Memory
- **18X more Memory**
  - 256 GB – 4.5 TB (per socket)
  - with Intel® Optane™ DC persistent memory

### Storage
- **Hyper-Converged Infrastructure supporting up to 4PB (Petabytes)**
  - High performance, advanced flash support NVMe, NVDIMM, Intel® Optane™ SSD, Intel® Optane™ DC persistent memory

### Networking
- **Up to 10x faster networking with Integrated Intel® Ethernet with iWARP RDMA**
  - Numerous network offloads
  - 10/25/40/50/100 Gb NICs

### Security
- **PLATFORM SECURITY**
  - UEFI, TPM 2.0, Secure Boot
- **ACCELERATED DATA ENCRYPTION**
  - Bitlocker, AES-NI
- **SHEILED VMs**
  - Windows & Linux

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https://ark.intel.com/#@Processors
Intel® Optane™ DC Persistent memory maintaining compute persistence

- Move Data Closer to Compute
- Maintain Persistency

Optimize performance given cost and power budget

Data Access Frequency

- Hot data
  - more often
- Cooler data
  - less often

Access Distribution

- DRAM HOT TIER
- SSD WARM TIER
- HDD / TAPE COLD TIER
- Intel® 3D Nand SSD

SSD

Network Storage

- 10s TB <100microsecs
- 1s TB <10microsecs
- 10s GB <100nanoseconds

HDD / TAPE

- 10sTB <100microsecs
- 10sTB <100milliseconds

Network Storage

- 10s TB <100milliseconds

Optimate performance given cost and power budget

- Intel® Optane™ DC Persistent memory
- Maintaining compute persistence
Azure Stack HCI with Intel Optane DC SSDs & 3D NAND

High-Endurance Cache

For systems that do not support Intel Optane DC Persistent Memory-

Use Intel Optane DC SSD as cache for Azure Stack HCI

2-Tier Storage architecture with high endurance (up to 60DWPD) cache to increase performance and utilize lower endurance drives for storage
### NEW INTEL® Ethernet 800 series

<table>
<thead>
<tr>
<th>Fixed Pipeline</th>
<th>Partially Programmable Pipeline</th>
<th>Queue and Steering Hardware Assists</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-IOV and VMDq</td>
<td>Table definition modifications with a Dynamic Device Personalization (DDP) profile package</td>
<td>Application Device Queues (ADQ)</td>
</tr>
<tr>
<td>Intel® Ethernet Adaptive Virtual Functions (Intel® AVF)</td>
<td></td>
<td>Fully Programmable Pipeline</td>
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<td>Table definition with DDP profile packages</td>
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<tr>
<td></td>
<td></td>
<td>Storage</td>
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<td>RDMA (iWARP* &amp; RoCE*v2)</td>
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<table>
<thead>
<tr>
<th>10GbE</th>
<th>40GbE</th>
<th>100GbE</th>
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<tbody>
<tr>
<td>10GbE</td>
<td>40GbE</td>
<td>100GbE</td>
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</table>

Features & schedule are subject to change. All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice.
Modernize Your Datacenter, Lower Operational Expenses

2nd Gen Intel® Xeon® Scalable Processor

Save with Fewer Servers while Achieving Similar Performance

20 servers based on Intel® Xeon® processor E5-2697 v2 [Ivy Bridge: Launch Q3’13] vs. 6 servers based on 2S Intel® Xeon® Platinum 8280 processor up to 59% Savings with less servers but similar performance levels

Performance results are based on testing as of dates shown in configuration and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit www.intel.com/benchmarks. Configurations:
1. Up to 3.5x VM density performance: 1-node, 2x E5-2697 v2 on Canon Pass with 256 GB (16 slots / 16GB / 1600) total memory, ucode 0x42c on RHEL7.6, 3.10.0-957.el7.x86_64, 1x Intel 400GB SSD OS Drive, 2x P4500 4TB PCIe, 2*82599 dual port Ethernet, Virtualization Benchmark, VM kernel 4.19, HT on, Turbo on, score: VM density=74, test by Intel on 1/15/2019. vs. 1-node, 2x 8280 on Wolf Pass with 768 GB (24 slots / 32GB / 2666) total memory, ucode 0x2000056 on RHEL7.6, 3.10.0-957.el7.x86_64, 1x Intel 400GB SSD OS Drive, 2x P4500 4TB PCIe, 2*82599 dual port Ethernet, Virtualization Benchmark, VM kernel 4.19, HT on, score: VM density=21, test by Intel on 1/15/2019.
2. Configuration details: Up to 59% TCO savings with Intel® Xeon® Scalable processor compared to 5-year old system. Cost reduction scenarios described are intended as examples of how a given Intel®-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary, Intel does not guarantee any costs or cost reduction. Example based on estimates as of March 2019 of equivalent rack performance over 4-year operation on virtualization workload running VMware vSphere Enterprise Plus on Red Hat Enterprise Linux Server and comparing 20 installed 2-socket servers with Intel® Xeon® processor E5-2697 v2 (formerly “Ivy Bridge”) at a total cost of $795,563 (Per server cost $39.8K: acquisition=13.7K, infrastructure and utility=4.2K, os & software=12.2K, maintenance=9.7K) vs. 6 new Intel® Xeon® Platinum 8280 (costs based on Platinum 8180 assumptions) at a total cost of $325,805 (Per server cost $54.3K: acquisition=26.9K, infrastructure and utility=3.3K, os & software=12.2K, maintenance=9.7K). Assumptions based on https://xeonprocessoradvisor.intel.com, assumptions as of Feb 13, 2019.
### Azure Stack HCI* Virtualization Consolidation upgrade

<table>
<thead>
<tr>
<th>System Memory</th>
<th>VMs per Node</th>
<th>Cost per VM Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>384 GB DDR4 DRAM</td>
<td>41</td>
<td>~$475¥ USD</td>
</tr>
<tr>
<td>CPU: Intel® Xeon® Gold 6230 Processor</td>
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<td></td>
</tr>
<tr>
<td>MEMORY: 384 GB DDR4 DRAM Memory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Intel® Optane™ DC Persistent Memory in Memory Mode + 512 GB Intel® Optane™ DC Persistent DRAM | 56 | ~$361¥ USD |
| CPU: Intel® Xeon® Gold 6230 Processor |
| MEMORY: 192 GB DDR4 DRAM Memory + 512 GB Intel Optane DC PMM |

More, affordable memory = lower cost per VM

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**Base System with 384 GB DDR4 DRAM**

- CPU: Intel® Xeon® Gold 6230 Processor
- MEMORY: 384 GB DDR4 DRAM Memory

**Intel® Optane™ DC Persistent Memory in Memory Mode**

- CPU: Intel® Xeon® Gold 6230 Processor
- MEMORY: 192 GB DDR4 DRAM Memory + 512 GB Intel Optane DC PMM

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**VMs per Node (higher is better)**

- Base System: 41
- Intel® Optane™ DC Persistent Memory: 56

**Cost per VM Opportunity (lower is better)**

- Base System: ~$475¥ USD
- Intel® Optane™ DC Persistent Memory: ~$361¥ USD

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**Pricing Guidance as of Oct 1, 2019**

- Valid until Dec 31, 2019

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* Other names and brands may be named as the property of others.
# 24 Validated HPE Azure Stack HCI Solutions*


<table>
<thead>
<tr>
<th></th>
<th>All-Flash NVMe</th>
<th>All-Flash SAS</th>
<th>Hybrid SAS</th>
<th>Hybrid NVMe +HDD</th>
<th>Hybrid SATA/SAS</th>
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<tr>
<td>HPE DL380 Gen10</td>
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<td>HPE Apollo 4200 Gen10</td>
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<td>HPE DL360 Gen 10</td>
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<tr>
<td>HPE ML350 Gen 10</td>
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</table>

How to Buy: Azure Stack HCI* solutions

**HARDWARE**
Buy validated hardware system from your preferred hardware partner

**SOFTWARE-DEFINED INFRASTRUCTURE**
Install Windows Server* 2019 Datacenter edition and Windows* Admin Center

**AZURE* SERVICES**
Option to use your Azure account to attach management and security services to virtual workloads

Note: Typical datacenter support model applies, not unified support model

* Other names and brands may be named as the property of others
Call to Action – Next Steps

Visit the demo stations to learn more about HPE solutions for Microsoft Azure Stack HCI and how HPE can help develop your hybrid-cloud strategy with Microsoft.

Ask us about our new reference architectures featuring Intel® Optane™ Technology and how they can accelerate your solutions

Intel Booth: Intelligent Retail Experience
Microsoft Booth: Microsoft Showcase
Partner Booths:

<table>
<thead>
<tr>
<th>Partner</th>
<th>Booth #</th>
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<tr>
<td>Cisco</td>
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<td>Dell Technologies</td>
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<td>Fujitsu</td>
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<td>HPE</td>
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<td>Lenovo</td>
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Learn More:
Intel® Select Solutions for Hybrid Cloud

Intel® Select Solutions for Azure Stack HCI
For Edge and Datacenter
# Azure Stack HCI Virtualization Configuration and Cost Details

<table>
<thead>
<tr>
<th>Test by</th>
<th>Intel</th>
<th>Intel</th>
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<tbody>
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<td>02/15/2019</td>
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<tr>
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<td>S2600WFD</td>
<td>S2600WFD</td>
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<tr>
<td># Nodes</td>
<td>4</td>
<td>4</td>
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<tr>
<td># Sockets</td>
<td>2</td>
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<tr>
<td>CPU</td>
<td>6230</td>
<td>6230</td>
</tr>
<tr>
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<tr>
<td>AEP FW version</td>
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<tr>
<td>System DDR Mem Config: slots / cap / run-speed</td>
<td>24 slots / 16GB / 2666</td>
<td>12 slots / 16GB / 2666</td>
</tr>
<tr>
<td>System DCPMM Config: slots / cap / run-speed</td>
<td>4 slots / 128GB / 2666</td>
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</tr>
<tr>
<td>Total Memory/Node (DDR, DCPMM)</td>
<td>384GB</td>
<td>192GB, 512GB</td>
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<tr>
<td>Storage - boot</td>
<td>1x Intel 800GB SSD OS Drive</td>
<td>1x Intel 800GB SSD OS Drive</td>
</tr>
<tr>
<td>Storage - application drives</td>
<td>2x P4800X 375GB Optane PCIe</td>
<td>2x P4800X 375GB Optane PCIe</td>
</tr>
<tr>
<td>NIC</td>
<td>1x Chelsio 25G NIC (iWARP)</td>
<td>1x Chelsio 25G NIC (iWARP)</td>
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<tr>
<td>PCH</td>
<td>Intel C621</td>
<td>Intel C621</td>
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<tr>
<td>Other HW (Accelerator)</td>
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<td>Compiler</td>
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<tr>
<td>Libraries</td>
<td>vmfleet</td>
<td>vmfleet</td>
</tr>
<tr>
<td>Other SW (Frameworks, Topologies…)</td>
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## Pricing Guidance