

**Hewlett Packard**  
Enterprise

# **HPE Storage Spaces Direct Solutions**

Fully Validated Microsoft WSSD Solutions

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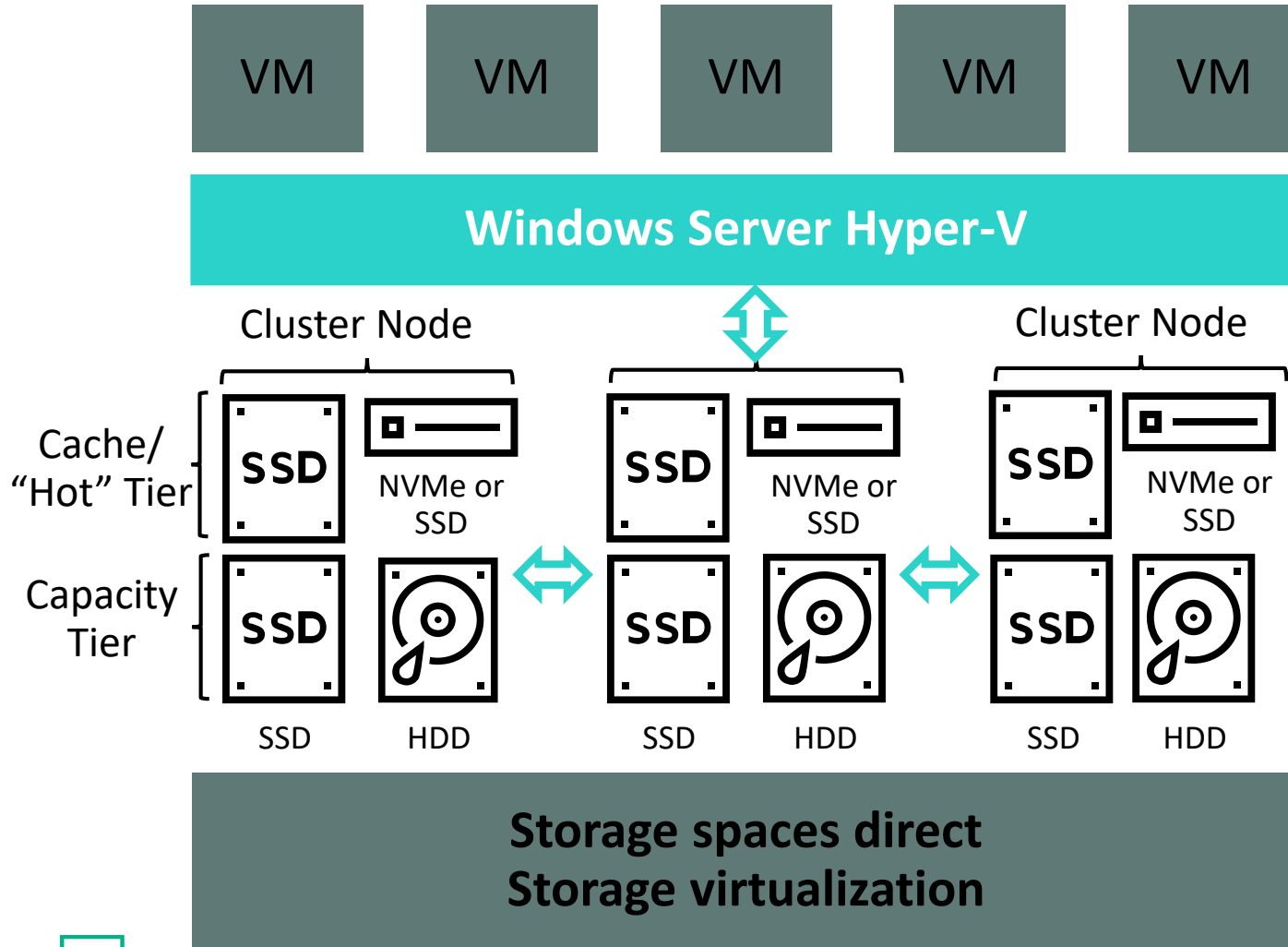


# Microsoft WSSD The HPE Way

Building a great Windows Server  
Storage Spaces Direct Solution

# What is Storage Spaces Direct (S2D)?

## Software-Defined Storage in Windows Server



### The basics

- Available in Windows Server Datacenter Edition
- Software-defined storage, utilizing locally attached storage, virtualized across cluster nodes
- Automatic tiering of cache and capacity drives: Fastest drives used for caching
- All flash or hybrid storage drive mix
- Highly resilient; mirroring, parity or mirror-accelerated parity (multi-resilient) data protection modes
- Storage for Hyper-V and private cloud
- Deployment choices: hyper-converged or converged (disaggregated)

# Microsoft Windows Server Software Defined (WSSD) Program

- Designed to establish a baseline for quality Storage Spaces Direct solutions
- Private Cloud Simulator (PCS) test suite simulating stress conditions and errors

– **Step 1:** S2D-specific *components* require WSSD validation with PCS component profiles applicable to

- SAS host-bus adapters (HBA mode only)
- Storage Devices (SSD, HDD, NVMe)
- 10Gb or faster Networking
  - Premium (with RDMA): **HPE default**
  - RoCE v2 or iWARP
  - Standard (w/o RDMA)

– **Step 2:** *Solution* validation by WSSD partner includes server, CPU, memory, networking, SAS controller, storage media

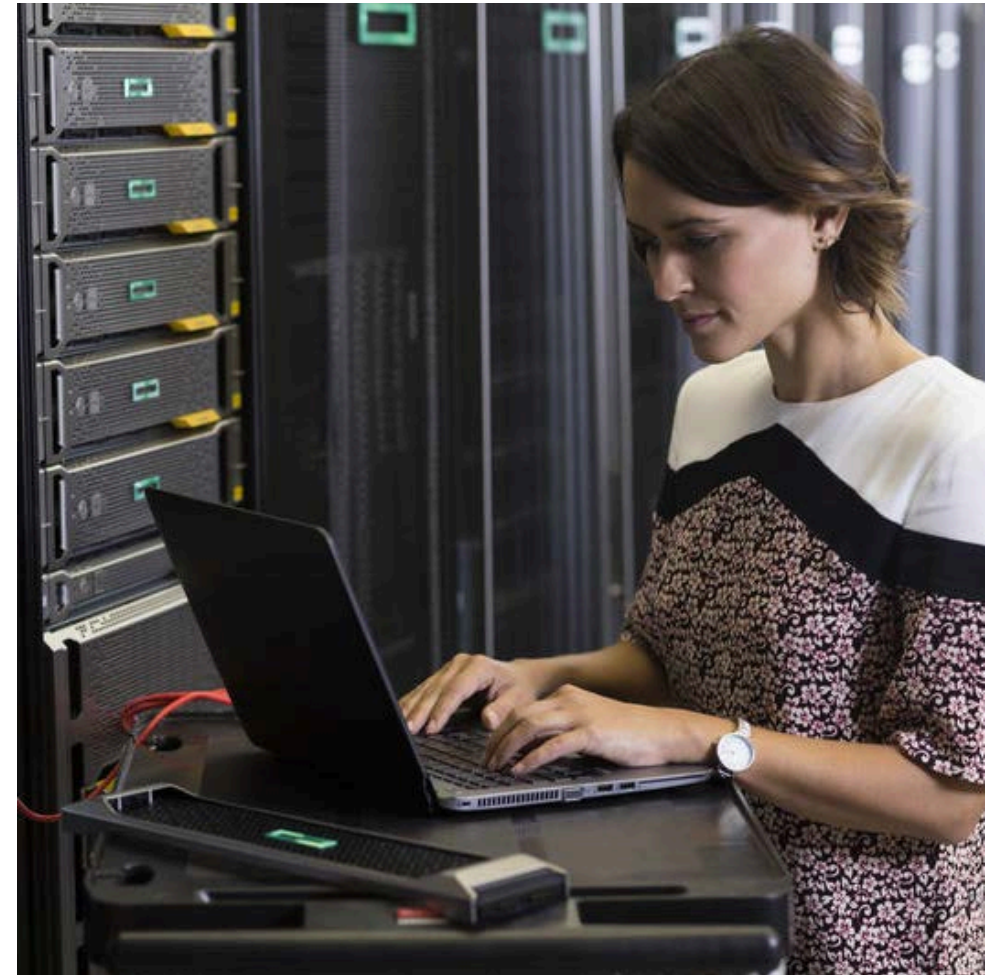
- PCS test run against cluster nodes with overall solution profiles
- Microsoft WSSD web page highlighting WSSD partners with validated solutions  
<https://www.microsoft.com/en-us/cloud-platform/software-defined-datacenter>

# Software Defined Storage in Windows Server

## Storage Spaces Direct (S2D)

### Why Storage Spaces Direct with HPE?

- Highly available and scalable with built-in configurable redundancy levels
  - WSSD validated industry-standard components
    - Proven HPE ProLiant Gen10 and Gen9 Servers
    - Cost efficient flash with SATA SSDs
    - Flash performance options with NVMe and SAS SSDs
    - Ethernet RDMA (Premium) used as storage fabric
  - Entire solution validated including server, CPU, memory, storage, SAS controllers, RDMA NICs
- 96-hour validation test run against nodes with approximately an entire year's worth of stress conditions and errors simulated by Private Cloud Simulator (PCS) test suite



# HPE Dedicated WSSD Innovation Solution Labs

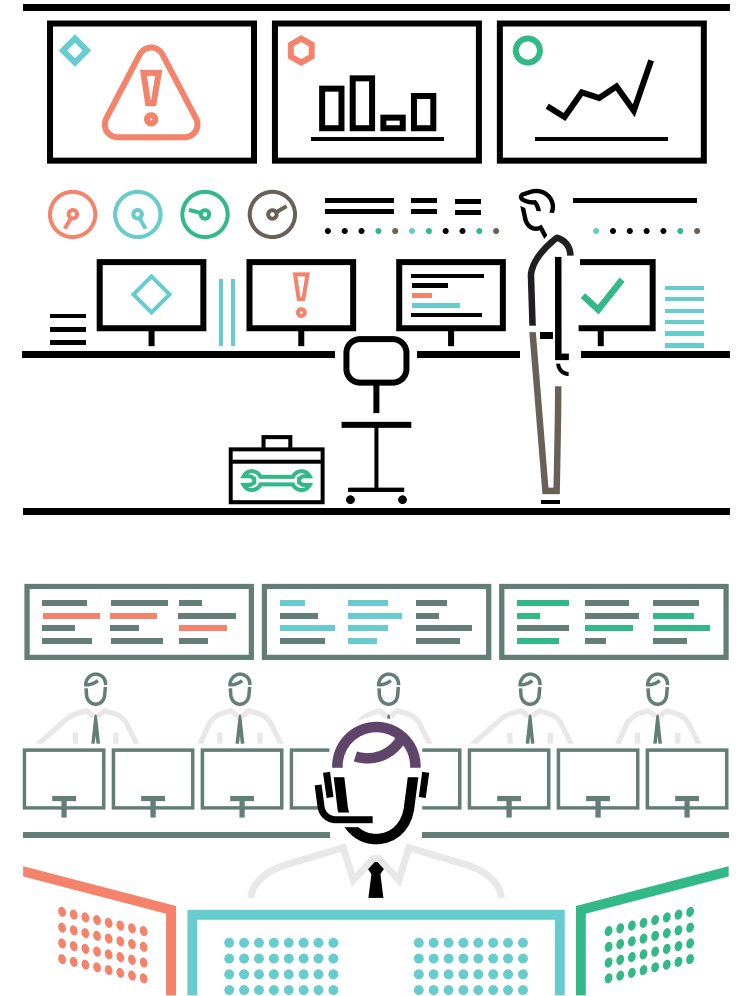
We go the extra mile so you don't have to

- **HPE WSSD solution labs:**

- DL380 Gen9 cluster
- DL380 Gen10 cluster
- ML350 Gen10 cluster

- **Support for a variety of options**

- 2-16 nodes
- 128GB – 3TB of RAM
- All DL380 Gen9 / Gen10 CPUs supported (choose clock speed and core count appropriate for workload and VM density)
- All DL380 Gen9 /Gen10 HPE Smart Array Controllers, networking adapters and storage devices (SSD, HDD and NVMe)



# Windows Server Storage Spaces Direct solutions

HPE Storage Spaces Direct White Paper available on HPE WSSD portal site (see “Helpful Links”)

Current S2D HW BOMs (posted as individual BOMs on HPE WSSD site):

**2\* node HC DL380 Gen10 SFF**

- 25GbE RDMA/RoCE v2
- Hybrid SATA/SAS 43.2TB/node

**2\* – 4 node HC DL380 Gen10 SFF**

- 100GbE RDMA/RoCE v2
- All Flash SAS 19.2TB/node

**2\* – 4 node HC DL380 Gen10 SFF**

- 25GbE RDMA/RoCE v2 or iWarp
- Hybrid SAS 38.4TB/node

**2\* – 8 node HC DL380 Gen10 LFF**

- 25GbE RDMA/RoCE v2
- Hybrid SATA/SAS 96TB/node

**2\* – 4 node HC ML350 Gen10 LFF**

- 25GbE RDMA/RoCE v2
- Hybrid SAS 48TB/node

**2\* – 12 node HC DL380 Gen9 LFF**

- 10GbE RDMA/RoCE v2
- Hybrid SATA 60TB/node

**2\* – 16 node HC DL380 Gen9 SFF**

- 10GbE RDMA/RoCE v2
- Hybrid SAS 38.4TB/node

**2\* – 8 node converged DL380 Gen9 LFF**

- 25GbE RDMA/RoCE v2
- Hybrid SATA 48TB/node

# WSSD Rules – BoM Flexibility Built In

## – Min / Max configuration validation:

### – 2 Nodes with minimum set:

- 128 GB RAM
- 1 CPU socket populated with entry-level processor
- Hybrid:
  - 2 cache tier drives (SSD)
  - 4 capacity tier drives (HDD)
- All flash:
  - 4 capacity tier drives (NVMe or SSD)

### – Max # nodes as appropriate

**(“sweet spot” up to 4 nodes, “stretch” 8 nodes, S2D max 16 nodes):**

- up to 768GB RDIMM / 3TB LRDIMM
- 2 CPU higher core count / frequency
- cache and capacity drives up to max # of drives in SFF / LFF chassis

## – Drive capacities used in solution validation enable use of any larger drive capacities

- Ex: 400GGB SAS SSD covers use of 800GB/1.6TB/3.2TB/+ in our catalog

## – Substitute drives must always be exactly the same Cache/Capacity bus types which is identified in the solution

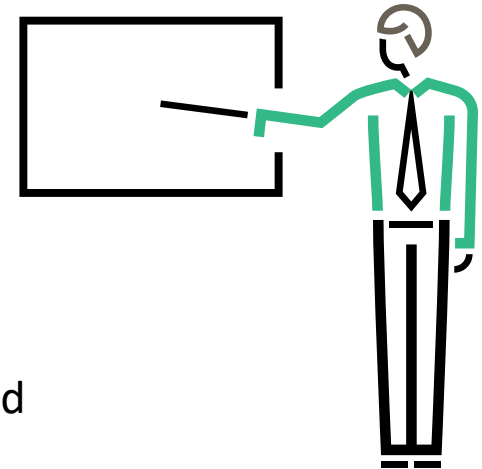
## – Any drive which is available at the time of order in our catalog may be used in our solutions



# Storage Spaces Direct, the HPE Way

**Right-size your HPE S2D solution using proven and WSSD validated building blocks.**

- “Bill of material” (BoM) approach
  - Industry-leading **HPE ProLiant DL380, ML 350 Gen10** systems as solid foundation
  - Range of **Microsoft SDDC Premium AQ validated components**:
    - Smart Array Controllers
    - Networking adapters
    - Storage Devices (SSD, HDD and NVMe)
- More than just the sum of its parts: complete BoM system solution extensively tested
  - HPE Storage Spaces Direct documentation including BOM list on **HPE WSSD portal**  
<http://www.hpe.com/solutions/wssd>



# Why choose HPE as your Windows Server Software Defined Solution provider?

**30**-year partnership  
with Microsoft, including joint R&D,  
sales and marketing



Deep engineering relationship.  
HPE R&D team and lab  
located on Microsoft Campus  
in Redmond WA.  
Active joint engineering work  
streams in progress.

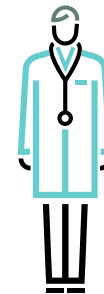
WSSD solutions built on the world's best  
selling server, the HPE ProLiant DL380 with  
more options than competing systems



Offers multiple purchasing models  
including leasing, pay as you go and  
capital purchase

**Faster problem resolution**

with integrated management tools, iLO, HPE OneView and  
HPE Insight Remote support





# Windows Server 2016 Software Defined Storage resources

## Helpful links

- HPE Technical White Paper "Implementing Microsoft Windows Server 2016 using HPE ProLiant Servers, Storage, and Options"
  - <https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA5-5841ENW.pdf>
- HPE Technical White Paper "Implementing Windows Server 2016 Storage Spaces Direct using HPE ProLiant servers"
  - <http://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=4aa6-8953enw>
  - Microsoft Storage Spaces Direct Overview  
<https://technet.microsoft.com/en-us/windows-server-docs/storage/storage-spaces/storage-spaces-direct-overview>
- Microsoft WSSD Website
  - <https://www.microsoft.com/en-us/cloud-platform/software-defined-datacenter>
- HPE Windows Server Software Defined / WSSD Homepage
  - <http://www.hpe.com/solutions/wssd>



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# Questions



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**Thank you**