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## QUOTATION

Quote # MWYQ23433

Date: 3/12/2018

Microway Confidential

### Quote To:

Pomona College  
Asya Shklyar  
333 N. College Way  
Claremont, CA 91711

(909) 607-9853  
[asya\\_shklyar@hotmail.com](mailto:asya_shklyar@hotmail.com)

### Ship To:

Pomona College  
Asya Shklyar  
333 N. College Way  
Claremont, CA 91711

(909) 607-9853  
[asya\\_shklyar@hotmail.com](mailto:asya_shklyar@hotmail.com)

### Sales Rep.

Samantha Wheeler  
508-732-5526  
[swheeler@microway.com](mailto:swheeler@microway.com)

Qty	Description	Your Price	Extended Price
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Microway is a small business, woman owned and operated. We are building many clusters at any one time and have built thousands of custom clusters for universities, government research labs and agencies, and corporations. Microway has been in the scientific computing business since 1982.

#### 1 Microway NumberSmasher Xeon + NVIDIA GPU Server (with 4 GPUs)

\$27,945

\$27,945

NumberSmasher Xeon + GPU Tower / 4U Rackmount (Black)  
2200W High-Efficiency "Titanium" Redundant 1+1 Power Supply  
Two Intel Xeon Scalable Family processors (Socket P - up to 205W)  
Triple Intel UPI interconnects between CPU sockets (up to 10.4 GT/s)  
Both CPU sockets support Skylake-F CPU models with integrated Omni-Path  
Sixteen slots for up to 2TB ECC DDR4-2666 memory  
Dual Intel X550 10 Gigabit Ethernet ports (RJ45, 10GBase-T)  
Integrated Intel C621 chipset and ASpeed AST2500 Graphics Controller  
IPMI 2.0 w/ Virtual Media, KVM and Dedicated LAN Support  
PCI-E Slots Support:  
Four PCI-E x16 3.0 slots (double-width for GPUs or coprocessors)  
Two PCI-E x16 3.0 slots (single-width, half-length)  
One PCI-E x4 3.0 slot (x8 physical)  
Integrated SATA controller with ten SATA3 6Gb/s ports  
Eight hot-swap 3.5" 6Gbps SATA3 drive bays (optional SAS3)  
One fixed internal 3.5" drive bay  
Three 5.25" Peripheral Drive Bays  
Locking Front Chassis Bezel with Filter  
Internal ports: two SATA SuperDOM, one M.2 slot (PCIe 3.0 x4 NVMe via PCH), one serial COM header, one TPM header  
Internal USB: one USB 3.0 port (Type A), two USB 3.0 and two USB 2.0 via headers  
Rear ports: two 10GBase-T LAN, one IPMI LAN, one VGA, two USB 2.0, two USB 3.0, and one serial COM port  
Front I/O: power button, reset button, two USB 3.0 ports, headphone audio and mic ports  
Dimensions: 26.5" D x 7.0" H x 18.2" W, 58 lbs  
(convertible between Tower and 4U Rackmount configurations; rackmount kit sold separately)



26.5" to 36.4" Rackmount Rails (Black) for 4U Server

Kit for Passive GPU/Xeon Phi Support

(2) Intel Xeon 8176 "Skylake" 2.10 GHz 28-Core 14nm CPU - 165W TDP  
with two AVX-512 units per core, 38.50MB L3 Cache, up to 768GB DDR4-2666 memory, up to three 10.4GT/s UPI links  
Supports Hyper-Threading and Turbo Boost up to 3.80 GHz (clock speeds with AVX-512 instructions: 1.3-3.5 GHz)  
(optional F-SKU with support for 100GBps Intel Omni-Path fabric interconnect)  
(optional M-SKU with support for up to 1.5TB memory)

(12) 32GB DDR4 2666 MHz ECC/Registered Memory (Dual Rank)

**(384GB Total Memory @ 2666MHz)**

Qty	Description	Your Price	Extended Price
	240GB Intel DC S4500 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~1 Drive Write Per Day; 0.62 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 190 MB/s Random 4KB IOPS: up to 69,000 read; up to 16,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read  2.5" HDD Adapter for 3.5" HDD Carrier Tray <b>(Operating System)</b>  Mellanox ConnectX-3 Pro EN Single-Port QSFP 40G Ethernet Adapter PCI-E 3.0 x8 8GT/s; RoHS (R6) Compliant  40GigE Mellanox Ethernet Cable, QSFP+ Passive Copper, 3 meters, 30 AWG LITE-ON Dual Layer 24X DVD/CD Burner (Black) SATA DVD-R/+R: 24X, DVD+RW: 8X, DVD-RW: 6X CD-R: 48X, CD-RW: 32X  <b>CentOS 7.x Linux (or your distribution of choice) &amp; NVIDIA CUDA 9.0 installed, configured and tested.</b>   IPMI management capability is integrated on the motherboard. IPMI allows administrators to remotely monitor and control each computer individually. Capabilities include: * System Power On, Power Off and Reset * Monitor Fan Speeds, Component Temperatures and Voltages * Remote Serial Console and KVM Access * Virtual Media: local devices (CD, USB, etc) appear as directly connected to remote system   Microway Testing Procedure:  Each computer system is network booted to execute low-level memory tests for 12+ hours.  Once passed, operating systems are loaded and Linux stress tests are executed for 48+ hours. These tests include processor and memory intensive applications that have been shown to cause faults in the field. A separate set of tests accesses all sectors on each hard drive and runs filesystem-intensive applications to ensure drive and filesystem reliability.   <b>Microway's hardware warranty may be extended on an annual basis for up to 5 years total warranty.</b> <b>Microway provides lifetime technical support. Out-of-warranty repairs will be billed at Time and Materials rates.</b>   <b>Shipping and Insurance: prepay and add</b>  <div> <b>Total</b> <div>\$27,945</div> </div>		

Qty	Description	Your Price	Extended Price
<p>The following items are optional, and are not included in the total:</p>			
<input type="checkbox"/> 1	<b>Upgrade GPU to V100 16GB (Optional)</b> NVIDIA Tesla V100 PCI-E 16GB "Volta" GPU Accelerator Full-Speed PCI-E 3.0 x16 Link GV100 GPU chip with NVIDIA Passive Heatsink 5,120 CUDA Cores with Enhanced Unified Memory and Cooperative Groups 640 NVIDIA Tensor Cores optimized for Deep Learning training GPU-boost capability allows for increased clock speeds 16GB High-Bandwidth HBM2 Memory (900 GB/sec peak bandwidth) Supports INT8, INT32 integer; IEEE Half-, Single-, and Double-Precision Floating Point operations Performance (with GPU Boost): 112 TFLOPS (half), 14 TFLOPS (single), 7 TFLOPS (double) Double PCI slot form factor Power Consumption: 250W TDP (One 8- and one 6-pin connector on rear) Software Development Tools: OpenACC, OpenCL, C/C++ language compiler, debugger, profiler and memory analyzer Standard numerical libraries: cuDNN, nvGRAPH, FFT, BLAS, SPARSE, RAND & more: <a href="https://developer.nvidia.com/gpu-accelerated-libraries">https://developer.nvidia.com/gpu-accelerated-libraries</a> \$1,500 EDU discount per NVIDIA Tesla V100 16GB GPU (restrictions apply)	\$7,473	\$7,473
<input type="checkbox"/> 1	<b>Upgrade Memory to 768GB (Optional)</b> (12) 64GB DDR4 ECC LRDIMM 2666MHz Memory	\$5,892	\$5,892
<input type="checkbox"/> 1	<b>Upgrade Processors to: (Optional)</b> (2) Intel Xeon 8180 "Skylake" 2.50 GHz 28-Core 14nm CPU - 205W TDP with two AVX-512 units per core, 38.50MB L3 Cache, up to 768GB DDR4-2666 memory, up to three 10.4GT/s UPI links Supports Hyper-Threading and Turbo Boost up to 3.80 GHz (clock speeds with AVX-512 instructions: 1.7-3.5 GHz) (optional M-SKU with support for up to 1.5TB memory)	\$2,938	\$2,938
<input type="checkbox"/> 1	<b>Add Intel Optane SSD: (Optional)</b> Intel Optane SSD DC P4800X Series 375GB PCI-E NVMe SSD (Half-Height Half-Length) PCI-E x4 3.0 NVMeExpress Interface to System 3D XPoint Internal Solid State Drive Targeted Lifetime Endurance: 20.5 PBW Built in power protection Sequential Read: up to 2,400 MB/s Sequential Write: up to 2,000 MB/s Random Read IOPS: Up to 550,000 Random Write IOPS: Up to 500,000 Read Latency: 10µs Write Latency: 10µs 2,000,000 Hours MTBF Uncorrectable Bit Error Rate: 1 sector per 10 <sup>17</sup> bits read	\$1,284	\$1,284
<input type="checkbox"/> 1	<b>Add Intel Optane SSD: (Optional)</b>	\$2,755	\$2,755

Qty	Description	Your Price	Extended Price
	Intel Optane SSD DC P4800X Series 750GB PCI-E NVMe SSD (Half-Height Half-Length) PCI-E x4 3.0 NVMeExpress Interface to System 3D XPoint Internal Solid State Drive Targeted Lifetime Endurance: 41.0 PBW Built in power protection Sequential Read: up to 2,500 MB/s Sequential Write: up to 2,200 MB/s Random Read IOPS: Up to 550,000 Random Write IOPS: Up to 550,000 Read Latency: 10µs Write Latency: 10µs 2,000,000 Hours MTBF Uncorrectable Bit Error Rate: 1 sector per 10 <sup>17</sup> bits read		
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b> 480GB Intel DC S4500 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~1 Drive Write Per Day; 0.90 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 330 MB/s Random 4KB IOPS: up to 72,000 read; up to 20,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read	\$149	\$149
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b> 960GB Intel DC S4500 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~1 Drive Write Per Day; 1.86 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 490 MB/s Random 4KB IOPS: up to 72,000 read; up to 30,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read	\$381	\$381
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b> 1.9TB Intel DC S4500 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~1 Drive Write Per Day; 3.27 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 490 MB/s Random 4KB IOPS: up to 72,000 read; up to 33,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read	\$931	\$931
	<b>The following drives have higher endurance:</b>		
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b>	\$51	\$51

Qty	Description	Your Price	Extended Price
	240GB Intel DC S4600 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Endurance Rating (Lifetime Writes): ~3 Drive Writes Per Day; 1.4 PBW Full data path and Power loss protection; 256 bit AES encryption 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 260 MB/s Random 4KB IOPS: up to 72,000 read; up to 38,000 write Average Latency: 36µs read, 36 µs write		
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b>	\$185	\$185
	480GB Intel DC S4600 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~3 Drive Writes Per Day; 2.95 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 480 MB/s Random 4KB IOPS: up to 72,000 read; up to 60,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read		
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b>	\$674	\$674
	960GB Intel DC S4600 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~3 Drive Writes Per Day; 5.25 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 490 MB/s Random 4KB IOPS: up to 72,000 read; up to 65,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read		
<input type="checkbox"/> 1	<b>Upgrade SSD to: (Optional)</b>	\$1,504	\$1,504
	1.9TB Intel DC S4600 2.5" SATA 6Gbps 3D NAND SSD SATA 6Gb/s Interface (Supports 3Gb/s) 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~3 Drive Writes Per Day; 10.84 PBW Full data path and Power loss protection; 256 bit AES encryption Sustained sequential read: up to 500 MB/s Sustained sequential write: up to 480 MB/s Random 4KB IOPS: up to 72,000 read; up to 65,000 write Average Latency: 36µs read, 36 µs write 2,000,000 Hours MTBF Uncorrectable Bit Error Rate (UBER): 1 sector per 10 <sup>17</sup> bits read		

**FOB:** Destination (freight PPA)

**Ship Date:** 3 - 4 Weeks after receipt of order and documentation

**Warranty:** Two years offsite with replacement components typically cross-shipped within 24 hours of problem determination by Microway Tech Support.

**Technical Support** Lifetime technical support via telephone, fax, or email.

**Terms:** NET 30

**Shipping Method:** FedEx 2nd Day

The Buyer is responsible for any sales taxes or duties related to the purchase.

Since 1982 Microway has been a leader in providing high performance computing solutions. Microway specializes in building complex clusters, servers, and workstations. We are unique in having Linux expertise throughout our organization to provide testing of all systems at our assembly and integration center at our headquarters in Plymouth, Massachusetts. Our validation suite includes a number of MPI applications and Microway proprietary software, including MPI Link-Checker and InfiniScope.



Microway is classified as a small business - woman owned and operated.

Microway welcomes our customers (and potential customers) to personally visit our manufacturing facility. We value the opportunity to share our understanding of the systems we build, and to demonstrate our dedication to quality in our design, fabrication, final testing and technical support. Please contact me if you plan to be in or near Massachusetts and would like to make an appointment.

Prices subject to review at time of order due to world-wide component price volatility.

**This quote is valid for 30 days.**

# Server Block Diagram

NumberSmasher 4U Server with Four PCI-Express GPUs

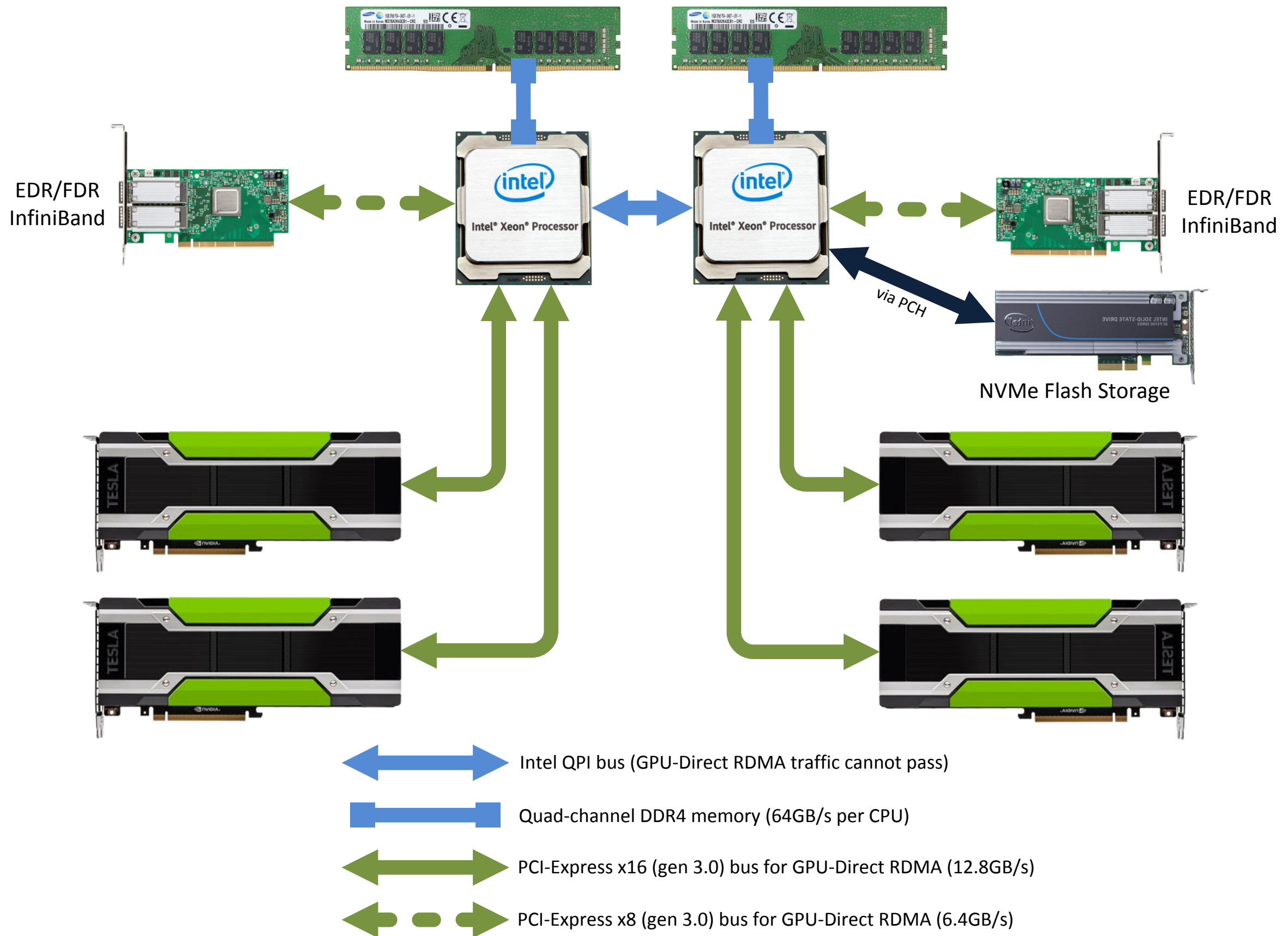


Diagram is for reference only. Internal components may vary depending upon your configuration.