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QUOTATION

Quote # MWYQ23428
Date: 3/9/2018
Microway Confidential

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Samantha Wheeler
508-732-5526
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Qty	Description	List Price	Your Price	Extended Price

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 Xeon + Tesla GPU 1U Compute Nodes** $20,758 $13,922 $13,922

NumberSmasher Dual Intel Xeon 1U GPU Server with
1600W 80 PLUS Platinum Redundant 1+1 Power Supplies
(power supplies require 208V power for redundancy under full load)
Up to two Intel Xeon E5-2600 Socket R3 processors
Intel C612 chipset
Intel QuickPath Interconnect (QPI) with system bus up to 9.6GT/s
Sixteen slots for up to 1024GB ECC DDR4-2400/2133 memory
Dual Integrated Intel i350 Gigabit Ethernet ports
Three PCI-E x16 3.0 slots for double-width GPUs
One PCI-E x8 3.0 Slot (Physical x16, low-profile)
Integrated AST2400 Graphics Controller
Integrated SATA3 6Gbps Controller
IPMI 2.0 w/ Virtual Media, KVM and Dedicated LAN Support
1 VGA, 2 Gigabit LAN, 1 IPMI LAN, 2 USB 3.0 ports, 1 serial header
Four hot-swap 2.5" SAS/SATA Hard Drive Bays
Also supports coprocessors
Rackmount Rail Kit Included

NVIDIA Tesla P100 PCI-E 16GB "Pascal" GPU Accelerator
Full-Speed PCI-E 3.0 x16 Link
GP100 GPU chip with NVIDIA-certified Passive Heatsink
3584 CUDA Cores with Unified Memory and Page Migration Engine
GPU-boost capability allows for increased clock speeds
16GB High-Bandwidth HBM2 Memory (732 GB/sec peak bandwidth)
IEEE Half-, Single-, and Double-Precision Floating Point
Performance (with GPU Boost): 18.7 TFLOPS (half), 9.3 TFLOPS (single), 4.7 TFLOPS (double)
Double PCI slot form factor
Power Consumption: 250W TDP (One 8- and one 6-pin connector on rear)
Software Development Tools:
C/C++ language compiler, debugger, profiler and memory analyzer
Standard numerical libraries: cuDNN, nvGRAPH, FFT, BLAS, SPARSE, RAND & more:
https://developer.nvidia.com/gpu-accelerated-libraries

(2) Intel Xeon E5-2637v4 Broadwell-EP 3.50 GHz Four Core 14nm CPU
with 15MB L3 Cache, DDR4-2400, 9.6 GT/sec QPI, 135W
Supports Hyper-Threading and Turbo Boost up to 3.7 GHz

(8) 32GB DDR4 2400 MHz ECC/Registered Memory (Dual Rank)

(256GB Total Memory @ 2400MHz)

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

Qty	Description	List Price	Your Price	Extended Price

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 10^17 bits read

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

CentOS 7.x Linux (or your distribution of choice) and NVIDIA CUDA installed, configured, and tested.

Diskless configurations also available. Please inquire.

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

1	**NVIDIA Academic Instant Rebate**	-$1,500	-$1,500	-$1,500

$1,500 EDU discount per NVIDIA Tesla P100 16GB GPU (restrictions apply)

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 24+ 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.

Microway's hardware warranty may be extended on an annual basis for up to 5 years total warranty.

Microway provides lifetime technical support. Out-of-warranty repairs will be billed at Time and Materials rates.

Shipping and Insurance: prepay and add

Total (Academic Pricing) **$12,422**

Qty	Description	List Price	Your Price	Extended Price

The following items are optional, and are not included in the total:

☐ 1 **Switch P100 to 12GB GPU (Optional)** -$992 -$992

NVIDIA Tesla P100 PCI-E 12GB "Pascal" GPU Accelerator
Full-Speed PCI-E 3.0 x16 Link
GP100 GPU chip with NVIDIA-certified Passive Heatsink
3584 CUDA Cores with Unified Memory and Page Migration Engine
GPU-boost capability allows for increased clock speeds
12GB High-Bandwidth HBM2 Memory (549 GB/sec peak bandwidth)
IEEE Half-, Single-, and Double-Precision Floating Point
Performance (with GPU Boost): 18.7 TFLOPS (half), 9.3 TFLOPS (single), 4.7 TFLOPS (double)
Double PCI slot form factor
Power Consumption: 250W TDP (One 8- and one 6-pin connector on rear)
Software Development Tools:
C/C++ language compiler, debugger, profiler and memory analyzer
Standard numerical libraries: cuDNN, nvGRAPH, FFT, BLAS, SPARSE, RAND & more:
https://developer.nvidia.com/gpu-accelerated-libraries

$1,250 EDU discount per NVIDIA Tesla P100 12GB GPU (restrictions apply)

☐ 1 **Upgrade GPU to V100 16GB (Optional)** $2,768 $2,768

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:
https://developer.nvidia.com/gpu-accelerated-libraries

$1,500 EDU discount per NVIDIA Tesla V100 16GB GPU (restrictions apply)

☐ 1 **Upgrade Memory to 512GB (Optional)** $3,064 $3,064

(16) 32GB DDR4 2400 MHz ECC/Registered Memory (Dual Rank)

☐ 1 **Upgrade Processors to: (Optional)** $1,266 $1,266

(2) Intel Xeon E5-2643v4 Broadwell-EP 3.40 GHz Six Core 14nm CPU
with 20MB L3 Cache, DDR4-2400, 9.6 GT/sec QPI, 135W
Supports Hyper-Threading and Turbo Boost up to 3.7 GHz

☐ 1 **Upgrade Processors to: (Optional)** $2,418 $2,418

(2) Intel Xeon E5-2667v4 Broadwell-EP 3.20 GHz Eight Core 14nm CPU
with 25MB L3 Cache, DDR4-2400, 9.6 GT/sec QPI, 135W
Supports Hyper-Threading and Turbo Boost up to 3.6 GHz

☐ 1 **Upgrade to Dual Port Ethernet Adapter (Optional)** $76 $76

Mellanox ConnectX-3 Pro EN Dual-Port QSFP 40G Ethernet Adapter
PCI-E 3.0 x8 8GT/s; RoHS (R6) Compliant

☐ 1 **Add up to 3 additional drives (Optional)** $156 $156

Qty	Description	List Price	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 10^17 bits read			
☐	1 **Upgrade SSD to: (Optional)**		$149	$149
	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 10^17 bits read			
☐	1 **Upgrade SSD to: (Optional)**		$381	$381
	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 10^17 bits read			
☐	1 **Upgrade SSD to: (Optional)**		$931	$931
	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 10^17 bits read			
	The following drives have higher endurance:			
☐	1 **Upgrade SSD to: (Optional)**		$51	$51
	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 10^17 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			
☐	1 **Upgrade SSD to: (Optional)**		$185	$185

Qty	Description	List Price	Your Price	Extended Price
	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 10^17 bits read			
☐	1 **Upgrade SSD to: (Optional)**		$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 10^17 bits read			
☐	1 **Upgrade SSD to: (Optional)**		$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 10^17 bits read			
☐	1 **Add PCI-E NVMe SSD: (Optional)**		$1,901	$1,901
	Intel DC P4600 Series 2TB PCI-E NVMe SSD (Half-Height Half-Length) PCI-E x4 3.1 NVMExpress Interface to System 3D NAND TLC Internal Solid State Drive Targeted Lifetime Endurance: ~3 Drive Writes Per Day, 11.08 PBW Built in power protection Sequential Read: up to 3,200 MB/s Sequential Write: up to 1,575 MB/s Random Read IOPS: Up to 610,000 Random Write IOPS: Up to 196,650 Read Latency: 85µs Write Latency: 15µs 2,000,000 Hours MTBF Uncorrectable Bit Error Rate: 1 sector per 10^17 bits read			

Qty	Description	List Price	Your Price	Extended Price

FOB: Destination (freight PPA)

Ship Date: 4 - 5 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 Freight

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.

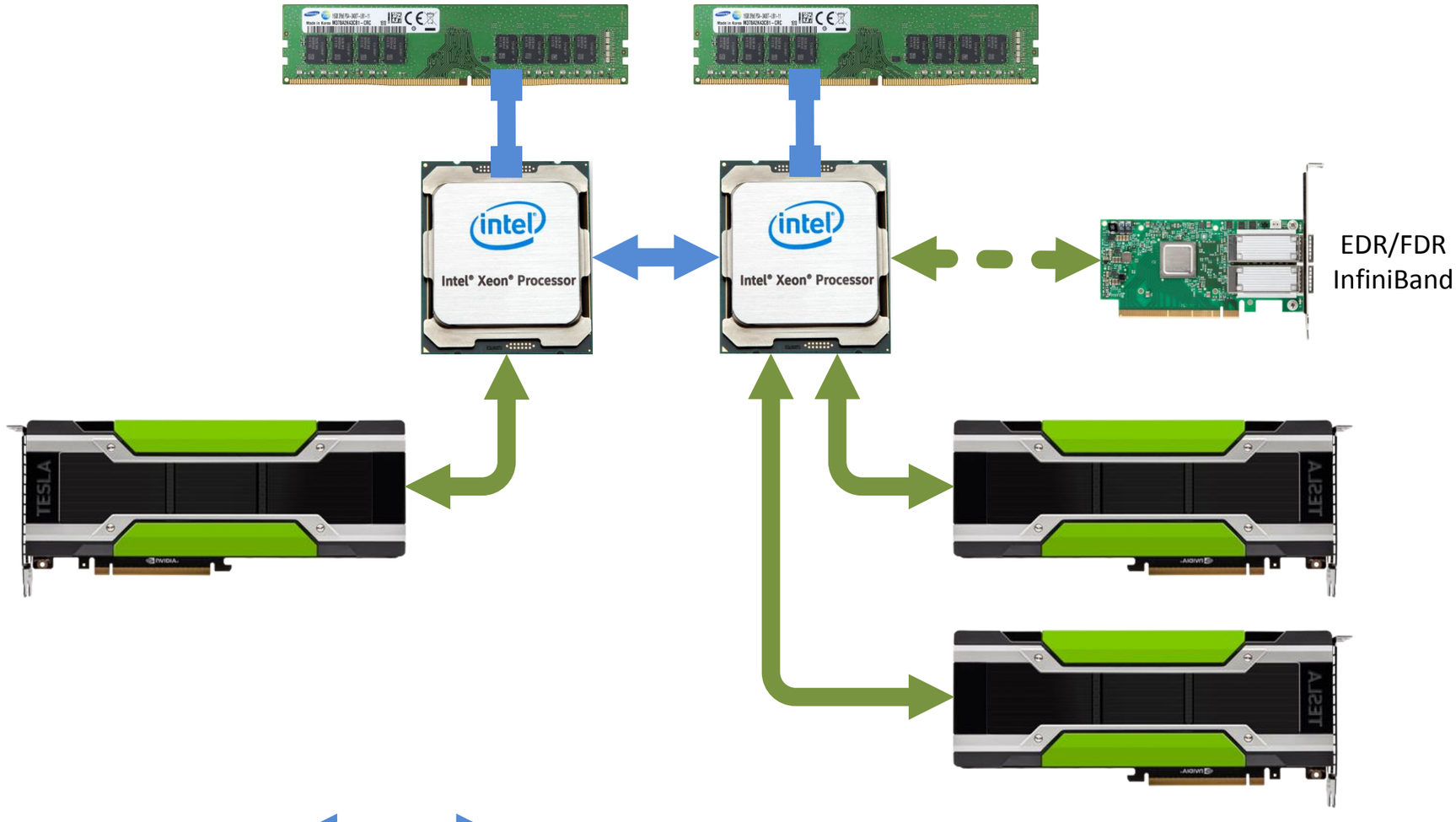
Microway welcomes our customers (and potential customers) to personally visit our manufacturing facility. We value the opportunity to share our understanding of the systems we build, and to demonstrate our dedication to quality in our design, fabrication, final testing and technical support. Please contact 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 1U Server with Three PCI-Express GPUs



Intel QPI bus (GPU-Direct RDMA traffic cannot pass)

Quad-channel DDR4 memory (64GB/s per CPU)

PCI-Express x16 (gen 3.0) bus for GPU-Direct RDMA (12.8GB/s)

PCI-Express x8 (gen 3.0) bus for GPU-Direct RDMA (6.4GB/s)

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