

<b>Workload</b>	<b>Description</b>	<b>2S Intel® Xeon® Platinum 81xx Performance Ratio Patched vs Unpatched</b>
Integer Throughput	CPU-intensive integer and floating point workloads, stressing a system's processor, memory subsystem, and compiler	98.7%
Floating Point Throughput		99.2%
Linpack	Measures the performance of a series of linear algebra computations	99.5%
STREAM	Measure for platform memory bandwidth	99.9%
Server Side Java	Benchmark for evaluating the performance and scalability of environments for Java business applications	100%
Energy Efficiency	Evaluates the power and performance characteristics of a sever	100%
OLTP Brokerage	Measures database performance, modeling brokerage firm - customer transaction, execution of orders, and updating accounts	96.1%
FlexibleIO (FIO) - 4k random	Simulations of different types of IO loads	Throughput (IOPs): 100% Read: 100% 100% Write: 82% 70% Read / 30% Write: 98%
		CPU Utilization (% pt change): 100% Read: +22 pts 100% Write: +2 pts 70% Read / 30% Write: +20pts
SPDK - vHost/iSCSI	Storage Performance Development Kit (SPDK) Tools and libraries for writing high performance, scalable, user-mode storage applications	100%/75% using single core only

**Source:** Intel

**Notices & Disclaimers:**

The benchmark results reported above may need to be revised as additional testing is conducted. The results depend on the specific platform configurations and workloads utilized in the testing, and may not be applicable to any particular user's components, computer system or workloads. The results are not necessarily representative of other benchmarks and other benchmark results may show greater or lesser impact from mitigations.

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 information go to <http://www.intel.com/performance/datacenter>. Configurations: see below

**Integer Throughput:** SPECrate\*2017\_int\_base (measured on Intel internal platform; ratios provided as research usage), SKU Model #: 8180M, Platform: Wolf Pass S2600WF, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 32 GB/ 2666

MT/s DDR4 RDIMM, Total Memory per Node: 384, Running Memory Speed: 2666 MT/s, # DIMMs populated per channel: 1, DIMM P/N : Samsung M393A4K40BB2-CTD, DIMM capacity: 32GB, Compiler / version: Intel® Compiler IC18 OEM, Optimized libraries / versions: AVX512, Storage - boot drive (capacity/model #): SSD DC S3710 series 800GB. Patched: uCode version: 0x200003C, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel: 3.10.0-693.11.6.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.0R.64.2018.01.2.01.0939.selfboot vs. Unpatched: uCode version: 0x2000030, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel: 3.10.0-693.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.00.01.0009.101920170742

**Floating Point Throughput:** SPECrate\*2017\_fp\_base (measured on Intel internal platform; ratios provided as research usage), SKU Model #: 8180M, Platform/ (Motherboard part # if known): Wolf Pass S2600WF, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 32 GB/ 2666 MT/s DDR4 RDIMM, Total Memory per Node: 384, Running Memory Speed: 2666 MT/s, # DIMMs populated per channel: 1, DIMM P/N : Samsung M393A4K40BB2-CTD, DIMM capacity: 32GB, Compiler / version: Intel® Compiler IC18 OEM, Optimized libraries / versions: AVX512, Storage - boot drive (capacity/model #): SSD DC S3710 series 800GB. Patched: uCode version: 0x200003C, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel: 3.10.0-693.11.6.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.0R.64.2018.01.2.01.0939.selfboot vs. Unpatched: uCode version: 0x2000030, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel: 3.10.0-693.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.00.01.0009.101920170742

**LINPACK:** based on Intel internal measurements on STREAM - Triad: SKU Model #: Intel® Xeon® Platinum 8180, Platform: Wolf Pass / S2600WF>, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 32 GB/ 2666 MT/s DDR4 RDIMM, Total Memory per Node (GB): 384, Running Memory Speed: 2666 MT/s, # DIMMs populated per channel: 1, DIMM P/N : Samsung M393A4K40BB2-CTD, Benchmark software version (or date): Stream AVX512 IC17, Compiler / version: Intel® Compiler IC17 update 2, Optimized libraries / versions: IC17\_AVX512, Storage - boot drive (capacity/model #): SSD DC S3700 series, Network speed: 10Gb/s. Patched: uCode version: 0x200003A, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7D703F59, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.11.6.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.00.01.0009.010820181103 vs. Unpatched: uCode version: 0x2000030, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7D703F59, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.el7.x86\_64 x86\_64, BIOS version: SE5C620.86B.00.01.0009.101920170742

**STREAM:** Intel internal measurement based on STREAM - Triad: SKU Model #: Intel® Xeon® Platinum 8180, Platform: Wolf Pass / S2600WF>, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 32 GB/ 2666 MT/s DDR4 RDIMM, Total Memory per Node (GB): 384, Running Memory Speed: 2666 MT/s, # DIMMs populated per channel: 1, DIMM P/N : Samsung M393A4K40BB2-CTD, Benchmark software version (or date): Stream AVX512 IC17, Compiler / version: Intel® Compiler IC17 update 2, Optimized libraries / versions: IC17\_AVX512, Storage - boot drive (capacity/model #): SSD DC S3700 series, Network speed: 10Gb/s. Patched: uCode version: 0x200003A, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7D703F59, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.11.6.el7.x86\_64 x86\_64 vs. Unpatched: uCode version: 0x2000030, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7D703F59, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.el7.x86\_64 x86\_64

**Server Side Java:** SPECjbb2015 - MultiJVM (measured on Intel internal platform; ratios provided as research usage), SKU Model #: Intel® Xeon® Platinum 8180, Platform/ (Motherboard part # if known): Wolf Pass / S2600WF>, # of Nodes: 1, # of Sockets: 2, Memory configuration: 24 slots/16GB/2666MT/s DDR4, Total Memory per Node: 384 GB, Running Memory Speed: 2666 MT/s GB, DIMM P/N : Samsung M393A2G40EB2-CTD, Benchmark software version (or date): SPECjbb2015 1.01 (05/25/2017), Other Software: Oracle JDK1.8-u131, network devices: 4 x Intel 82599 10 Gigabit X520-SR2 (PCI-E 2.4). Patched: uCode version: 0x200003c, ME Firmware version: 04.00.04.294, BMC Firmware version: 1.43.33e8d6b4, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.11.6.el7.x86\_64, BIOS version: SE5C620.86B.0X.01.0108.010220180939 , vs. Unpatched: uCode version: 0x2000030, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7d703f59, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: 3.10.0-693.el7.x86\_64, BIOS version: 00.01.0009

**OLTP Brokerage:** Intel internal measurement based on OLTP Brokerage workload for research usage, SKU Model #: Intel® Xeon® Platinum 8160 , Platform/ (Motherboard part # if known): Wolfpass(S2600WFD), # of Nodes: 1, # of Sockets: 2, Memory configuration: 2 DPC/DDR4 RDIMM/24 slots/ 32 GB, Total Memory per Node: 768 GB, Running Memory Speed: 2666 MT/s, DIMM P/N : MT36AASF4G72PZ-2G6D1QG, Other Software: commercial database, Storage - boot drive (capacity/model #): Intel® SSD 320 Series, Storage - application drives (capacity/model #): Intel® SSD DC S3700 ,52\*800 GB SSD's, network devices: Intel® X520 network card\*1, Intel® RAID Controller RS35C008\*5. Patched: uCode version: 0200003c, ME Firmware version: 04.00.04.294, BMC Firmware version: 1.43.33E8D6B4, OS / version: Windows DataCenter RS1 x64 14393 with KB4056890 , OS Kernel version: 10.0.14393, BIOS version: SE5C620.86B.0X.01.0108.010220180939, vs. Unpatched: uCode version: 02000030,

ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7D703F59, OS / version: Windows DataCenter RS1 x64 14393, OS Kernel version: 10.0.14393, BIOS version: SE5C620.86B.00.01.0009.101920170742

**Energy Efficiency:** SPECpower\_ssj2008 (ratios provided for research usage; measured on Intel internal platform), SKU Model #: Intel® Xeon® Platinum 8180, Platform: Wolf Pass / S2600WF>, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 16 GB / 2666 MT/s DDR4 RDIMM, Total Memory per Node (GB): 192, Running Memory Speed: 2666 MT/s, DIMM P/N : Micron Crucial MTA36ASF2G72PZ-2G6B2QG, Benchmark software version (or date): SPECpower\_ssj2008 v 1.12, Other Software: IBM JAVA runtime java version "1.6.0\_45", Storage - boot drive (capacity/model #): SSD DC S3520 series 800 GB. Patched: uCode version: 0x0200003C, ME Firmware version: 04.00.04.294, BMC Firmware version: 1.43.33E8D6B4, OS / version: Windows Server 2016 Datacenter R1 with update KB4056890, BIOS version: SE5C620.86B.0X.01.0108 vs. Unpatched: uCode version: 0x02000030, ME Firmware version: 04.00.04.288, BMC Firmware version: 1.29.7d703f59, OS / version: Windows Server 2016 Datacenter R1, BIOS version: SE5C620.86B.00.01.0009

**Flexible IO:** Intel internal measurement based on Flexible IO for research usage, SKU Model #: Intel® Xeon® Platinum 8180, Platform/ (Motherboard part # if known): Neon City, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 16 GB / 2666 MB/s DDR4, Total Memory per Node: 192, Running Memory Speed: 2666 MT/s, Benchmark software version (or date): FIO 3.3, Compiler / version: GCC 4.8.5 20150623, Storage - boot drive (capacity/model #): SSD DC S3610 400GB, Storage - application drives (capacity/model #): 4 \* 1.6 TB DC P4600 Series PCIe NVMe. Patched: uCode version: 0x0200003A, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.11.6.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959, vs. Unpatched: uCode version: 0x02000035, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959

**SPDK vHOST:** Intel internal measurement based on SPDK vHOST workload for research usage, SKU Model #: Intel® Xeon® Platinum 8180, Platform/ (Motherboard part # if known): Neon City, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 16 GB / 2666 MT/s DDR4 RDIMM, Total Memory per Node: 192, Running Memory Speed: 2666 MT/s, DIMM P/N : Micron MTA36ASF2G72PZ-2G6B1QI, Benchmark software version (or date): FIO 3.3, Optimized libraries / versions: SPDK 17.10.1, Other Software: Qemu: 2.8.50 (v2.8.0-1821-gf0bd850), Storage - boot drive (capacity/model #): SSD DC S3700 400GB, Storage - application drives (capacity/model #): 4x 1.6TB P4610 (all conneted to socket 1), network devices: 1x 100GbE Mellanox NIC: Ethernet controller: Mellanox Technologies MT27700 Family [ConnectX-4] = connected to socket 1. 1 port connected. Patched: uCode version: 0200003A, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.11.6.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959 vs. Unpatched: uCode version: 02000035, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959

**SPDK iSCSI:** Intel internal measurement based on SPDK iSCSI workload for research usage, SKU Model #: Intel® Xeon® Platinum 8180, Platform/ (Motherboard part # if known): Neon City, # of Nodes: 1, # of Sockets: 2, Memory configuration: 12 slots / 16 GB / 2666 MB/s DDR4, Total Memory per Node: 192, Running Memory Speed: 2666 MT/s, DIMM P/N : Micron MTA36ASF2G72PZ-2G6B1QI, Benchmark software version (or date): FIO 3.3, Optimized libraries / versions: SPDK-17.10.1, Other Software: , Storage - boot drive (capacity/model #): SSD DC S3700 400GB, Storage - application drives (capacity/model #): 4x 1.6TB P4610 (all conneted to socket 1), network devices: 1x 100GbE Mellanox NIC: Ethernet controller: Mellanox Technologies MT27700 Family [ConnectX-4] = connected to socket 1. 1 port connected. Patched: uCode version: 0x0200003A, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.11.6.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959 vs. Unpatched: uCode version: 0x02000035, BMC Firmware version: NC\_BMC\_PO\_79\_20\_r10373, OS / version: Red Hat Enterprise Linux\* 7.4, OS Kernel version: Kernel 3.10.0-693.el7.x86\_64, BIOS version: PLYDCRB1.LIN.0149.R09.1711090959