## SPEC CPU®2017 Floating Point Speed Result

**NEC Corporation**

**Express5800/R120h-1M (Intel Xeon Silver 4208)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>38.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>39.0</td>
</tr>
</tbody>
</table>

### Software
- **OS:** Red Hat Enterprise Linux Server release 7.7 (Maipo)  
  - Kernel 3.10.0-1062.1.1.el7.x86_64  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;  
  - Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux  
- **Firmware:** NEC BIOS Version U32 v2.22 11/13/2019 released Mar-2020  
- **File System:** ext4  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage.

### Hardware
- **CPU Name:** Intel Xeon Silver 4208  
  - Max MHz: 3200  
  - Nominal: 2100  
  - Enabled: 8 cores, 1 chip  
  - Orderable: 1.2 chips  
  - Cache L1: 32 KB I + 32 KB D on chip per core  
  - L2: 1 MB I+D on chip per core  
  - L3: 11 MB I+D on chip per chip  
  - Other: None  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0  
- **Other:** None

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<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base (38.5)</th>
<th>SPECspeed®2017_fp_peak (39.0)</th>
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<tbody>
<tr>
<td><strong>Threads</strong></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s 8</td>
<td>607.cactuBSSN_s 8</td>
</tr>
<tr>
<td>619.lbm_s 8</td>
<td>621.wrf_s 8</td>
</tr>
<tr>
<td>627.cam4_s 8</td>
<td>628.pop2_s 8</td>
</tr>
<tr>
<td>638.imagick_s 8</td>
<td>644.nab_s 8</td>
</tr>
<tr>
<td>649.fotonik3d_s 8</td>
<td>654.roms_s 8</td>
</tr>
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</table>

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<tr>
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<th>Test Date: Mar-2020</th>
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<td>Hardware Availability: Dec-2019</td>
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<td>Software Availability: Sep-2019</td>
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SPECspeed®2017_fp_peak = 39.0

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Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>8</td>
<td>358</td>
<td>165</td>
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<td>607.cactuBSSN_s</td>
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<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<td>353</td>
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<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td>37.2</td>
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<td>480</td>
<td>32.8</td>
<td>480</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3 > /proc/sys/vm/drop_caches

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.
**SPEC CPU®2017 Floating Point Speed Result**

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Express5800/R120h-1M (Intel Xeon Silver 4208)  

| SPECspeed®2017_fp_base = 38.5 | SPECspeed®2017_fp_peak = 39.0 |

**CPU2017 License:** 9006  
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**Test Date:** Mar-2020  
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---

**Platform Notes**

BIOS Settings:
- Thermal Configuration: Maximum Cooling
- Workload Profile: General Peak Frequency Compute
- Intel Hyper-Threading: Disabled
- Memory Patrol Scrubbing: Disabled
- LLC Dead Line Allocation: Disabled
- LLC Prefetch: Enabled
- Enhanced Processor Performance: Enabled
- Workload Profile: Custom
  - Advanced Memory Protection: Advanced ECC Support
  - NUMA Group Size Optimization: Flat

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011  
running on r120h1m Tue Mar 31 16:21:06 2020

SUT (System Under Test) info as seen by some common utilities.  
For more information on this section, see  
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
- model name : Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
- 1 "physical id"s (chips)
- 8 "processors"
  - cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
    - cpu cores : 8  
    - siblings : 8  
    - physical 0: cores 0 1 2 3 4 5 6 7

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 8  
- On-line CPU(s) list: 0-7
- Thread(s) per core: 1  
- Core(s) per socket: 8
- Socket(s): 1  
- NUMA node(s): 1  
- Vendor ID: GenuineIntel  
- CPU family: 6  
- Model: 85
- Model name: Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
- Stepping: 6  
- CPU MHz: 2100.000
- BogoMIPS: 4200.00

(Continued on next page)
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SPECspeed®2017_fp_base = 38.5

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Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nop1 xtopology nonstop_tsc
aperfemperf eagerfpu nni pclmulqdq dtstes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtr pdcmd pcid dca se4_1 se4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single
intel_pinn intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnum
flexpriority vpid fsqgsbase tsc_adjust bml hle avx2 smep bni2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw
avx512vl xsavesopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pln pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp
flush_l1d arch_capabilities

/cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.

available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 196265 MB
node 0 free: 191471 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 197748348 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.7 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.7"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.7 (Maipo)"

(Continued on next page)
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Platform Notes (Continued)

redhat-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.7:ga:server

uname -a:
    Linux r120h1m 3.10.0-1062.1.1.el7.x86_64 #1 SMP Tue Aug 13 18:39:59 UTC 2019 x86_64
    x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Mar 31 16:15

SPEC is set to: /home/cpu2017
    Filesystem  Type Size  Used Avail Use% Mounted on
    /dev/sda3   ext4  908G  77G  786G   9% /

From /sys/devices/virtual/dmi/id
    BIOS: NEC U32 11/13/2019
    Vendor: NEC
    Product: Express5800/R120h-1M
    Serial: JPN0084094

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
    Memory:
        12x HPE P03050-091 16 GB 2 rank 2933
        12x UNKNOWN NOT AVAILABLE

(End of data from sysinfo program)
Regarding the sysinfo display about the memory speed, the correct configured memory speed is 2400 MT/s. The dmidecode description should be as follows:
12x HPE P03050-091 16 GB 2 rank 2933, configured at 2400
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Compiler Version Notes

==============================================================================
| C                          | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak) |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) |
| 64, Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak) |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.227 Build 20190416 |
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11
Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC.Suppress/OpenMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs
654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

(Continued on next page)
Peak Optimization Flags (Continued)

654.roms_s (continued):
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevE.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-03-31 03:21:05-0400.