NEC Corporation

Express5800/R120h-1E (Intel Xeon Silver 4108)

SPECrate2017_fp_base = 81.8
SPECrate2017_fp_peak = 83.9

<table>
<thead>
<tr>
<th>Software</th>
<th>OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compiler: C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td></td>
<td>Parallel: No</td>
</tr>
<tr>
<td></td>
<td>Firmware: NEC BIOS Version U31 06/20/2018 released Sep-2018</td>
</tr>
<tr>
<td></td>
<td>File System: ext4</td>
</tr>
<tr>
<td></td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td></td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td></td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td></td>
<td>Other: None</td>
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<table>
<thead>
<tr>
<th>Hardware</th>
<th>CPU Name: Intel Xeon Silver 4108</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max MHz.: 3000</td>
</tr>
<tr>
<td></td>
<td>Nominal: 1800</td>
</tr>
<tr>
<td></td>
<td>Enabled: 16 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td></td>
<td>Orderable: 2 chips</td>
</tr>
<tr>
<td></td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td></td>
<td>L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td></td>
<td>L3: 11 MB I+D on chip per chip</td>
</tr>
<tr>
<td></td>
<td>Other: None</td>
</tr>
<tr>
<td></td>
<td>Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
</tr>
<tr>
<td></td>
<td>Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0</td>
</tr>
<tr>
<td></td>
<td>Other: None</td>
</tr>
</tbody>
</table>

| Test Sponsor: NEC Corporation |
|-----------------------------|-----------------------------|
| Tested by: NEC Corporation |
| Hardware Availability: Nov-2017 |
| Software Availability: Mar-2018 |
| Hardware | CPU2017 License: 9006 |
|          | Test Date: Jan-2019 |
|          | Test Sponsor: NEC Corporation |
|          | Software Availability: Mar-2018 |

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<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tr>
<td>503.bwaves_r</td>
<td>32</td>
<td>62.3</td>
<td>83.9</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
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<td>83.9</td>
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<td>508.namd_r</td>
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<td>527.cam4_r</td>
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<td>67.8</td>
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<tr>
<td>538.imagick_r</td>
<td>32</td>
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<tr>
<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

NEC Corporation
Express5800/R120h-1E (Intel Xeon Silver 4108)

SPECrate2017_fp_base = 81.8
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Results Table

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<thead>
<tr>
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<td>49.3</td>
</tr>
</tbody>
</table>

SPECrate2017_fp_base = 81.8
SPECrate2017_fp_peak = 83.9

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

Submit Notes
The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes
Stack size set to unlimited using "ulimit -s unlimited"

General Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"

Binaries compiled on a system with 1x Intel Core i7-6700K 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
runcpu command invoked through numactl i.e.:
umactl --interleave=all runcpu <etc>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
SPEC CPU2017 Floating Point Rate Result

NEC Corporation
Express5800/R120h-1E (Intel Xeon Silver 4108)

SPECrate2017_fp_base = 81.8
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Jan-2019
Hardware Availability: Nov-2017
Software Availability: Mar-2018

General Notes (Continued)

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.

Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Workload Profile: General Throughput Compute
Memory Patrol Scrubbing: Disabled
LLC Dead Line Allocation: Disabled
LLC Prefetch: Enabled
Workload Profile: Custom
Sub-NUMA Clustering: Disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on r120h1e Mon Jan 7 21:42:23 2019

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 4108 CPU @ 1.80GHz
 2  "physical id"s (chips)
32 "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 : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: 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): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

NEC Corporation

Express5800/R120h-1E (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base = 81.8</th>
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</table>

CPU2017 License: 9006  
Test Sponsor: NEC Corporation  
Test Date: Jan-2019  
Tested by: NEC Corporation  
Hardware Availability: Nov-2017  
Software Availability: Mar-2018

Platform Notes (Continued)

Vendor ID:             GenuineIntel  
CPU family:            6  
Model:                 85  
Model name:            Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz  
Stepping:              4  
CPU MHz:               1800.000  
BogoMIPS:              3600.00  
Virtualization:        VT-x  
L1d cache:             32K  
L1i cache:             32K  
L2 cache:              1024K  
L3 cache:              11264K  
NUMA node0 CPU(s):     0-7,16-23  
NUMA node1 CPU(s):     8-15,24-31  
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx fl64 rdrand lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ersedv invpcid rdtsa rdrand adx smap clflushopt clwb avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cmq_occu_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

/cache size : 11264 KB

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

available: 2 nodes (0-1)  
node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23  
node 0 size: 97953 MB  
node 0 free: 95474 MB  
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31  
node 1 size: 98303 MB  
node 1 free: 95808 MB  
node distances:  
  node 0 1  
    0: 10 21  
    1: 21 10

From /proc/meminfo  
MemTotal: 197737824 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

(Continued on next page)
NEC Corporation

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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Platform Notes (Continued)

From /etc/*release*/etc/*version*
oś-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.4 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VARIANT="Server"
  VARIANT_ID="server"
  VERSION_ID="7.4"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
  Linux r120h1e 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Jan 7 21:36

SPEC is set to: /home/cpu2017
Filesystem  Type Size Used Avail Use% Mounted on
/dev/sda3    ext4  909G  284G  579G  33% /

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.

BIOS NEC U31 06/20/2018
Memory:
  4x UNKNOWN NOT AVAILABLE
  12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| CC | 519.lbm_r(base) | 538.imagick_r(base, peak) | 544.nab_r(base, peak) |
==============================================================================

(Continued on next page)
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Software Availability: Mar-2018

Compiler Version Notes (Continued)

icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC 519.lbm_r(peak)
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icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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CXXC 508.namd_r(base) 510.parest_r(base, peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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==============================================================================
FC 507.cactuBSSN_r(base, peak)
icpc (ICC) 18.0.2 20180210

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Compiler Version Notes (Continued)

Copyright (C) 1985–2018 Intel Corporation. All rights reserved.

icc (ICC) 18.0.2 20180210
Copyright (C) 1985–2018 Intel Corporation. All rights reserved.

ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985–2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
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icc (ICC) 18.0.2 20180210
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------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

(Continued on next page)
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
NEC Corporation

Express5800/R120h-1E (Intel Xeon Silver 4108)

SPEC CPU2017 Floating Point Rate Result

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SPECrate2017_fp_base = 81.8
SPECrate2017_fp_peak = 83.9

NEC Corporation

Test Date: Jan-2019
Hardware Availability: Nov-2017
Software Availability: Mar-2018

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -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
SPEC CPU2017 Floating Point Rate Result

NEC Corporation
Express5800/R120h-1E (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Optimization Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>519.lbm_r</td>
<td>-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3</td>
</tr>
<tr>
<td>503.bwaves_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs</td>
</tr>
</tbody>
</table>

Benchmarks using both Fortran and C:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:
511.povray_r -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
### NEC Corporation

#### Express5800/R120h-1E (Intel Xeon Silver 4108)

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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Hardware Availability:** Nov-2017  
**Software Availability:** Mar-2018  
**Test Date:** Jan-2019

The flags files that were used to format this result can be browsed at:


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-RevB.xml](http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.xml)

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