**SPEC CPU®2017 Floating Point Rate Result**

**NEC Corporation**

Express5800/R120h-1M (Intel Xeon Gold 6246R)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>228</td>
<td>240</td>
</tr>
</tbody>
</table>

**Cpu2017 License:** 9006

**Test Sponsor:** NEC Corporation

**Tested by:** NEC Corporation

**Test Date:** Nov-2020

**Hardware Availability:** May-2020

**Software Availability:** Sep-2019

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>(240)</td>
<td>548</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>(228)</td>
<td>548</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>263</td>
<td>320</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>115</td>
<td>120</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>246</td>
<td>250</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>236</td>
<td>257</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>250</td>
<td>269</td>
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<tr>
<td>527.cam4_r</td>
<td>564</td>
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<tr>
<td>538.imagick_r</td>
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<tr>
<td>544.nab_r</td>
<td>164</td>
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<tr>
<td>549.fotonik3d_r</td>
<td>110</td>
<td>131</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Gold 6246R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz</td>
<td>4100</td>
</tr>
<tr>
<td>Nominal</td>
<td>3400</td>
</tr>
<tr>
<td>Enabled</td>
<td>32 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>35.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

| Memory | 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R) |
| Storage| 1 x 1 TB SATA, 7200 RPM, RAID 0 |

**Software**

<table>
<thead>
<tr>
<th>OS</th>
<th>Red Hat Enterprise Linux Server release 7.7 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>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</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>NEC BIOS Version U32 v2.32 03/09/2020 released Jun-2020</td>
</tr>
<tr>
<td>File System</td>
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</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
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<tr>
<td>Peak Pointers</td>
<td>64-bit</td>
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<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS set to prefer performance at the cost of additional power usage.</td>
</tr>
</tbody>
</table>
## SPEC CPU®2017 Floating Point Rate Result

### NEC Corporation

**Express5800/R120h-1M (Intel Xeon Gold 6246R)**

| SPECrate®2017_fp_base = 228 | SPECrate®2017_fp_peak = 240 |

<table>
<thead>
<tr>
<th>CPU2017 License: 9006</th>
<th>Test Date: Nov-2020</th>
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<tbody>
<tr>
<td>Test Sponsor: NEC Corporation</td>
<td>Hardware Availability: May-2020</td>
</tr>
<tr>
<td>Tested by: NEC Corporation</td>
<td>Software Availability: Sep-2019</td>
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### Results Table

<table>
<thead>
<tr>
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<th>Seconds</th>
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<td>131</td>
<td>387</td>
<td>131</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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"

### Environment Variables Notes

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

### 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

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**NEC Corporation**

**Express5800/R120h-1M (Intel Xeon Gold 6246R)**

| SPECrate®2017_fp_base | 228 |
| SPECrate®2017_fp_peak | 240 |

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

**Test Date:** Nov-2020  
**Hardware Availability:** May-2020  
**Software Availability:** Sep-2019

---

**General Notes (Continued)**

runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <etc>

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.

---

**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  
Enhanced Processor Performance: Enabled

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011  
running on r120h1m Wed Nov 4 16:34:59 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) Gold 6246R CPU @ 3.40GHz  
- 2 "physical id"s (chips)  
- 64 "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 : 16  
- siblings : 32

- physical 0: cores 0 1 3 9 12 13 16 17 18 19 20 21 26 27 29
- physical 1: cores 0 2 3 10 12 13 16 17 18 19 20 21 26 27 29

From lscpu:

- Architecture: x86_64  
- CPU op-mode(s): 32-bit, 64-bit  
- Byte Order: Little Endian  
- CPU(s): 64  
- On-line CPU(s) list: 0-63

(Continued on next page)
Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6246R CPU @ 3.40GHz
Stepping: 7
CPU MHz: 3400.000
BogoMIPS: 6800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-7,32-39
NUMA node1 CPU(s): 8-15,40-47
NUMA node2 CPU(s): 16-23,48-55
NUMA node3 CPU(s): 24-31,56-63
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 eagerfsu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch ebpxcat_13 cpdp_13 invpcid_single intel_p6 pentium intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmp mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vb xsaveopt xsaves xsavecn xgetbv1 cmp_llc cmp_occu(llc cmp_mbb_total cmp_mbb_local dtherm ida arat pin pts pkup ospe avx512_1vni md_clear spec_ctrl intel_stibp flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
node 0 size: 97960 MB
node 0 free: 95573 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
node 1 size: 98304 MB
node 1 free: 95998 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 98304 MB

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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NEC Corporation

Express5800/R120h-1M (Intel Xeon Gold 6246R)

SPECrate®2017_fp_base = 228
SPECrate®2017_fp_peak = 240

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Nov-2020
Tested by: NEC Corporation
Hardware Availability: May-2020
Software Availability: Sep-2019

Platform Notes (Continued)
	node 2 free: 95995 MB
	node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
	node 3 size: 98303 MB
	node 3 free: 95982 MB
	node distances:

0: 10 21 21 21
1: 21 10 21 21
2: 21 21 10 21
3: 21 21 21 10

From /proc/meminfo

MemTotal:       395918732 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)"
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 Nov 4 16:29

(Continued on next page)
NEC Corporation

Express5800/R120h-1M (Intel Xeon Gold 6246R)

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Platform Notes (Continued)

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 908G 236G 626G 28% /

From /sys/devices/virtual/dmi/id
BIOS: NEC U32 03/09/2020
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:
24x HPE P03050-091 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(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++             | 508.namd_r(base, peak) 510.parest_r(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          | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
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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------------------------------------------------------------------------------

(Continued on next page)
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| Tested by: | NEC Corporation |

---

### Compiler Version Notes (Continued)

(C) 1985-2019 Intel Corporation. All rights reserved.

```markdown
C++, C, Fortran | 507.cactuBSSN_r(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
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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 | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(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.
```

---

### Base Compiler Invocation

**C benchmarks:**  
`icc -m64 -std=c11`

**C++ benchmarks:**  
`icpc -m64`

(Continued on next page)
NEC Corporation

Express5800/R120h-1M (Intel Xeon Gold 6246R)

SPECrate®2017_fp_base = 228
SPECrate®2017_fp_peak = 240

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation
Test Date: Nov-2020
Hardware Availability: May-2020
Software Availability: Sep-2019

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.ibm_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=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**NEC Corporation**

Express5800/R120h-1M (Intel Xeon Gold 6246R)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 228</th>
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<tr>
<td>SPECrate®2017_fp_peak = 240</td>
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<tr>
<th>CPU2017 License: 9006</th>
<th>Test Date: Nov-2020</th>
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<tr>
<td>Test Sponsor: NEC Corporation</td>
<td>Hardware Availability: May-2020</td>
</tr>
<tr>
<td>Tested by: NEC Corporation</td>
<td>Software Availability: Sep-2019</td>
</tr>
</tbody>
</table>

**Base Optimization Flags (Continued)**

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qqopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qqopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qqopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

**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
Peak Optimization Flags

C benchmarks:

519.lbm_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=4

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

508.namd_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=4

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_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=4 -auto -nostandard-realloc-lhs
-align array32byte

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=4 -auto -nostandard-realloc-lhs
-align array32byte

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=4

(Continued on next page)
PEC CPU®2017 Floating Point Rate Result

NEC Corporation
Express5800/R120h-1M (Intel Xeon Gold 6246R)

SPECrate®2017_fp_base = 228
SPECrate®2017_fp_peak = 240

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

Test Date: Nov-2020
Hardware Availability: May-2020
Software Availability: Sep-2019

Peak Optimization Flags (Continued)

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=4 -auto -nostandard-realloc-lhs
-align array32byte

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 2020-11-04 02:34:58-0500.