**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Platinum 8176)**

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECspeed2017_fp_base = 126</th>
<th>SPECspeed2017_fp_peak = 127</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2017 License:</td>
<td>9006</td>
<td>Test Date: Sep-2018</td>
</tr>
<tr>
<td>Test Sponsor:</td>
<td>NEC Corporation</td>
<td>Hardware Availability: Aug-2017</td>
</tr>
<tr>
<td>Tested by:</td>
<td>NEC Corporation</td>
<td>Software Availability: Mar-2018</td>
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</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (126)</th>
<th>SPECspeed2017_fp_peak (127)</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s 56</td>
<td></td>
<td></td>
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<tr>
<td>607.cactuBSSN_s 56</td>
<td></td>
<td></td>
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<tr>
<td>619.lbm_s 56</td>
<td></td>
<td></td>
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<tr>
<td>621.wrf_s 56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>627.cam4_s 56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>628.pop2_s 56</td>
<td></td>
<td></td>
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<tr>
<td>638.imagick_s 56</td>
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<td></td>
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<tr>
<td>644.nab_s 56</td>
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<td></td>
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<tr>
<td>649.fotonik3d_s 56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s 56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Software

**CPU Name:** Intel Xeon Platinum 8176  
**Max MHz.:** 3800  
**Nominal:** 2100  
**Enabled:** 56 cores, 2 chips  
**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:** 38.5 MB I+D on chip per chip  
**Other:** None  
**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)  
**Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0  
**Other:** None  

**OS:** Red Hat Enterprise Linux Server release 7.4  
(Maipo)  
**Kernel:** 3.10.0-693.21.1.el7.x86_64  
**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  
**Parallel:** Yes  
**Firmware:** NEC BIOS Version U30 02/15/2018 released Mar-2018  
**File System:** ext4  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** jemalloc memory allocator V5.0.1
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Base</th>
<th>Base</th>
<th>Peak</th>
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<td>202</td>
<td>58.7</td>
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<td><strong>58.3</strong></td>
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<td>638.imagick_s</td>
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<td><strong>106</strong></td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td>85.6</td>
<td><strong>106</strong></td>
<td><strong>86.0</strong></td>
<td>106</td>
<td>86.1</td>
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<tr>
<td>654.roms_s</td>
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<td><strong>145</strong></td>
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<td>146</td>
<td>109</td>
<td>145</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base = 126**

**SPECspeed2017_fp_peak = 127**

### 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:

- KMP_AFFINITY = "granularity=fine,compact"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

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
```

Yes: 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 CPU2017 Floating Point Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

NEC Corporation

Express5800/R120h-2M (Intel Xeon Platinum 8176)

SPECspeed2017_fp_base = 126
SPECspeed2017_fp_peak = 127

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Sep-2018
CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation
Hardware Availability: Aug-2017
Software Availability: Mar-2018

Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Workload Profile: General Peak Frequency Compute
Intel Hyper-Threading: Disabled
Memory Patrol Scrubbing: Disabled
Energy/Performance Bias: Maximum Performance
LLC Dead Line Allocation: Disabled
Workload Profile: Custom
NUMA Group Size Optimization: Flat
Adjacent Sector Prefetch: Disabled
DCU Stream Prefetcher: Disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on r120h2m Mon Sep 24 09:23:03 2018

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) Platinum 8176 CPU @ 2.10GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8176 CPU @ 2.10GHz
Stepping: 4

(Continued on next page)
## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Platinum 8176)**

<table>
<thead>
<tr>
<th>SPEC speed2017_fp_base</th>
<th>SPEC speed2017_fp_peak</th>
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<td>126</td>
<td>127</td>
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### CPU2017 License: 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  

- **Test Date:** Sep-2018  
- **Hardware Availability:** Aug-2017  
- **Software Availability:** Mar-2018

### Platform Notes (Continued)

```
CPU MHz:               2100.000  
BogoMIPS:              4200.00  
Virtualization:        VT-x  
L1d cache:             32K  
L1i cache:             32K  
L2 cache:              1024K  
L3 cache:              39424K  
NUMA node0 CPU(s):     0-27  
NUMA node1 CPU(s):     28-55  
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov  
pat pse36 clflush dtst acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp  
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc  
aperfmperf eagerfp fu 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  
xs save avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single  
intel_pt spec_ctrl ibpb_support tpr_shadow vmmi flexpriority ept vpid fs gbase  
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rt m cqm mp x rdt_a avx512f avx512dq  
rds eed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsave v xgetbv1  
cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida ar at pln pts
```

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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27  
node 0 size:  196267 MB  
node 0 free:  191627 MB  
node 1 cpus:  28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55  
node 1 size:  196607 MB  
node 1 free:  192096 MB  
node distances:  
  node 0  1  
  0:  10  21  
  1:  21  10
```

From `/proc/meminfo`  
**MemTotal:** 395925512 kB  
**HugePages_Total:** 0  
**Hugepagesize:** 2048 kB

From `/etc/*release* /etc/*version*`  
**os-release:**

```
NAME="Red Hat Enterprise Linux Server"  
VERSION="7.4 (Maipo)"
```

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Platinum 8176)

SPECspeed2017_fp_base = 126
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Sep-2018
Hardware Availability: Aug-2017
Software Availability: Mar-2018

Platform Notes (Continued)

```
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 r120h2m 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 Sep 24 09:17

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 468G 395G 55% /

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 U30 02/15/2018
Memory:
24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

```
CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
```

(Continued on next page)
NEC Corporation

Express5800/R120h-2M (Intel Xeon Platinum 8176)

SPEC CPU2017 Floating Point Speed Result

SPECspeed2017_fp_base = 126
SPECspeed2017_fp_peak = 127

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Sep-2018
Tested by: NEC Corporation
Hardware Availability: Aug-2017
Software Availability: Mar-2018

Compiler Version Notes (Continued)

CC  619.ibm_s(peak)

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

FC 607.cactuBSSN_s(base, peak)

icpc (ICC) 18.0.2 20180210
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.

FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)

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

FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)

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

CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)

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

CC 621.wrf_s(peak) 628.pop2_s(peak)

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

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SPECspeed2017_fp_base = 126
SPECspeed2017_fp_peak = 127

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Sep-2018
Tested by: NEC Corporation
Hardware Availability: Aug-2017
Software Availability: Mar-2018

Compiler Version Notes (Continued)

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:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-W1,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

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**Software Availability:** Mar-2018

---

**Base Optimization Flags (Continued)**

Benchmarks using both Fortran and C:
- Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
- nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
- nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

---

**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:**

619.lbm_s: basepeak = yes

638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
- DSPEC_OPENMP

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Platinum 8176)

SPECspeed2017_fp_base = 126
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
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Hardware Availability: Aug-2017
Software Availability: Mar-2018

Peak Optimization Flags (Continued)

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes

654.roms_s: -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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-RevB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.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 CPU2017 v1.0.5 on 2018-09-23 20:23:02-0400.
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