## NEC Corporation

### Express5800/D120h (Intel Xeon Platinum 8164)

| Test Sponsor | NEC Corporation |
| Test Date | Aug-2018 |
| Hardware Availability | Jan-2018 |
| Software Availability | Mar-2018 |

### SPECrate2017_fp_base = 108  
SPECrate2017_fp_peak = 110

### SPEC CPU 2017 Results

<table>
<thead>
<tr>
<th>Test</th>
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<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
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<tr>
<td>503.bwaves_r</td>
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<td>107</td>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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<td>554.roms_r</td>
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<td>46.1</td>
<td>47.2</td>
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</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Platinum 8164
- **Max MHz.:** 3700
- **Nominal:** 2000
- **Enabled:** 26 cores, 1 chip, 2 threads/core
- **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:** 35.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (6 x 32 GB 2Rx4 PC4-2666V-R)
- **Storage:** 1 x 1 TB SATA, 7200 RPM
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo)
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
- **Parallel:** No
- **Firmware:** Version F21 02/22/2018 released Apr-2018
- **File System:** ext4
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
**SPEC CPU2017 Floating Point Rate Result**

**NEC Corporation**

Express5800/D120h (Intel Xeon Platinum 8164)

**SPECrate2017_fp_base = 108**

**SPECrate2017_fp_peak = 110**

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</tr>
</tbody>
</table>

**Results 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"

**General Notes**

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
```

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM

Memory using Redhat Enterprise Linux 7.4

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.:

```
numactl --interleave=all runcpu <etc>
```

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

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

NEC Corporation

Express5800/D120h (Intel Xeon Platinum 8164)

SPECrate2017_fp_peak = 110
SPECrate2017_fp_base = 108

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

Test Date: Aug-2018
Hardware Availability: Jan-2018
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:
ENERGY_PERF_BIAS_CFG mode: Performance
SNC: Enable
IMC Interleaving: 1-way Interleave
LLC dead line alloc: Disable
Patrol Scrub: Disable
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on d120h Fri Aug  3 20:13:22 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 8164 CPU @ 2.00GHz
   1 "physical id"s (chips)
   52 "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 : 26
siblings : 52
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28
   29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 52
On-line CPU(s) list: 0-51
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6

(Continued on next page)
## SPEC CPU2017 Floating Point Rate Result

**NEC Corporation**

Express5800/D120h (Intel Xeon Platinum 8164)

| SPECrate2017_fp_base | 108 |
| SPECrate2017_fp_peak | 110 |

<table>
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<th>Value</th>
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<td>Jan-2018</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Mar-2018</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```plaintext
Model: 85  
Model name: Intel(R) Xeon(R) Platinum 8164 CPU @ 2.00GHz  
Stepping: 4  
CPU MHz: 1861.484  
CPU max MHz: 3700.0000  
CPU min MHz: 1000.0000  
BogoMIPS: 4000.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 36608K  
NUMA node0 CPU(s): 0-3,7-9,13-15,20-22,26-29,33-35,39-41,46-48  
NUMA node1 CPU(s): 4-6,10-12,16-19,23-25,30-32,36-38,42-45,49-51  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acp1 mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art 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 pbTLB cat_l3 dcd_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ersed ms compulsory dtm rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 cmq_llc cmq_occnp_llc cmq_mbb_total cmq_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req
```

From `numactl --hardware`

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

```plaintext
available: 2 nodes (0-1)  
node 0 cpus: 0 1 2 3 7 8 9 13 14 15 20 21 22 26 27 28 29 33 34 35 39 40 41 46 47 48  
node 0 size: 96932 MB  
node 0 free: 94203 MB  
node 1 cpus: 4 5 6 10 11 12 16 17 18 19 23 24 25 30 31 32 36 37 38 42 43 44 45 49 50 51  
node 1 size: 98304 MB  
node 1 free: 95625 MB  
node distances:  
node 0 1  
0: 10 11  
1: 11 10
```

From `/proc/meminfo`

```plaintext
MemTotal: 196475872 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB
```

(Continued on next page)
NEC Corporation

NEC Corporation

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

Test Date: Aug-2018
Hardware Availability: Jan-2018
Software Availability: Mar-2018

SPEC CPU2017 Floating Point Rate Result

Express5800/D120h (Intel Xeon Platinum 8164)

SPECrate2017_fp_base = 108
SPECrate2017_fp_peak = 110

Platform Notes (Continued)

From /etc/*release* /etc/*version*

os-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 d120h 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
run-level 3 Aug 3 20:07

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 410G 452G 48% /

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 GIGABYTE F21 02/22/2018
Memory:
10x NO DIMM NO DIMM
6x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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(Continued on next page)
NEC Corporation
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Compiler Version Notes (Continued)

CC  519.lbm_r(peak) 544.nab_r(peak)

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

--------------------------------------------------------------------------------
CXXC 508.namd_r(base) 510.parest_r(base)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

--------------------------------------------------------------------------------
CXXC 508.namd_r(peak) 510.parest_r(peak)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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CC  511.povray_r(base) 526.blender_r(base)

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

--------------------------------------------------------------------------------
FC  507.cactuBSSN_r(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
NEC Corporation

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

NEC Corporation
Express5800/D120h (Intel Xeon Platinum 8164)

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Test Date: Aug-2018
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Compiler Version Notes (Continued)

FC  507.cactuBSSN_r(peak)
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
### Base Compiler Invocation

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icc

Benchmarks using both C and C++:
- icpc icc

Benchmarks using Fortran, C, and C++:
- icpc icc ifort

### 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 -03 -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-mem-layout-trans=3

C++ benchmarks:
- -xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only

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

C++ benchmarks (continued):
- -qopt-mem-layout-trans=3

Fortran benchmarks:
- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

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 -nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
- -m64 -std=c11

C++ benchmarks:
- -m64

Fortran benchmarks:
- -m64

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

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

Benchmarks using Fortran, C, and C++:
- -m64 -std=c11
### SPEC CPU2017 Floating Point Rate Result

**NEC Corporation**

**Express5800/D120h (Intel Xeon Platinum 8164)**

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

**Peak Compiler Invocation**

- **C benchmarks:**
  - `icc`

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

- **Fortran benchmarks:**
  - `ifort`

- **Benchmarks using both Fortran and C:**
  - `ifort icc`

- **Benchmarks using both C and C++:**
  - `icpc icc`

- **Benchmarks using Fortran, C, and C++:**
  - `icpc icc ifort`

**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=3`

  - `538.imagick_r`: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

  - `544.nab_r`: Same as `519.lbm_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=3`
### Peak Optimization Flags (Continued)

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
   -ffinite-math-only -qopt-mem-layout-trans=3
   -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=3 -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=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both C 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

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

### Peak Other Flags

C benchmarks:

- m64 -std=c11

C++ benchmarks:

- m64

Fortran benchmarks:

- m64

Benchmarks using both Fortran and C:

- m64 -std=c11

(Continued on next page)
### NEC Corporation

**Express5800/D120h (Intel Xeon Platinum 8164)**

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#### Peak Other Flags (Continued)

Benchmarks using both C and C++:

```bash
-m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```bash
-m64 -std=c11
```

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:


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