## NEC Corporation

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

### SPEC CPU®2017 Floating Point Rate Result

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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<td>= 46.9</td>
<td>= 48.9</td>
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### CPU2017 License: 9006

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</table>

**Test Date:** Mar-2020  
**Hardware Availability:** Dec-2019  
**Software Availability:** Sep-2019

### Hardware

- **CPU Name:** Intel Xeon Silver 4208
- **Max MHz:** 3200
- **Nominal:** 2100
- **Enabled:** 8 cores, 1 chip, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache 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

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.7 (Maipo)
- **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
- **Parallel:** No
- **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.
## Results Table

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<td>409</td>
<td>31.1</td>
<td>407</td>
<td>31.2</td>
</tr>
</tbody>
</table>

**Submit Notes**

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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
```
**NEC Corporation**

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

**SPEC CPU®2017 Floating Point Rate Result**  
Copyright 2017-2020 Standard Performance Evaluation Corporation

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**SPECrate®2017_fp_base = 46.9**  
**SPECrate®2017_fp_peak = 48.9**

**General Notes (Continued)**

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
- Workload Profile: Custom
- Advanced Memory Protection: Advanced ECC Support
- Sub-NUMA Clustering: Disabled

**Sysinfo program /home/cpu2017/bin/sysinfo**  
Rev: r6365 of 2019-08-21 295195f888a3d7edekte6e46a485a0011  
running on r120h1m Mon Mar 30 17:46:33 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)  
  16 "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

From lscpu:

- Architecture: x86_64  
- CPU op-mode(s): 32-bit, 64-bit  
- Byte Order: Little Endian  
- CPU(s): 16
- On-line CPU(s) list: 0-15
- Thread(s) per core: 2

(Continued on next page)
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SPECRate®2017_fp_base = 46.9

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Tested by: NEC Corporation

Test Date: Mar-2020
Hardware Availability: Dec-2019
Software Availability: Sep-2019

Platform Notes (Continued)

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
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-15
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 npt pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpre pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer tsc_adjust tvr_shadow vmx flexpriority vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mxp rdtd_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopt xsaveopt xsaves bqm_llc bqm_occup_llc bqm_mbb_total bqm_mbb_local dtherm ida arat pin pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_lld arch_capabilities

From /proc/cpuinfo cache data
  cache size: 11264 KB

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 8 9 10 11 12 13 14 15
  node 0 size: 196265 MB
  node 0 free: 191441 MB
  node distances:
  node 0
  0: 10

From /proc/meminfo
  MemTotal: 197747132 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

(Continued on next page)
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Platform Notes (Continued)

From /etc/*release* /etc/*version*
\textbf{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)"
\textbf{redhat-release:} Red Hat Enterprise Linux Server release 7.7 (Maipo)
\textbf{system-release:} Red Hat Enterprise Linux Server release 7.7 (Maipo)
\textbf{system-release-cpe:} cpe:/o:redhat:enterprise_linux:7.7:ga:server

\texttt{uname -a:}

\texttt{Linux r120h1m 3.10.0-1062.1.1.el7.x86_64 #1 SMP Tue Aug 13 18:39:59 UTC 2019 x86_64}
\texttt{x86_64 x86_64 GNU/Linux}

Kernel self-reported vulnerability status:

\textbf{CVE-2018-3620 (L1 Terminal Fault):} Not affected
\textbf{Microarchitectural Data Sampling:} Not affected
\textbf{CVE-2017-5754 (Meltdown):} Not affected
\textbf{CVE-2018-3639 (Speculative Store Bypass):} Mitigation: Speculative Store Bypass disabled via prctl and seccomp
\textbf{CVE-2017-5753 (Spectre variant 1):} Mitigation: Load fences, usercopy/swaps
\textbf{system-release-cpe:} cpe:/o:redhat:enterprise_linux:7.7:ga:server
\textbf{Kernel self-reported vulnerability status:}

\texttt{run-level 3 Mar 30 17:40}

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

\texttt{From /sys/devices/virtual/dmi/id}
\texttt{BIOS: NEC U32 11/13/2019}
\texttt{Vendor: NEC}
\texttt{Product: Express5800/R120h-1M}
\texttt{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.

\textbf{Memory:}
- 12x HPE P03050-091 16 GB 2 rank 2933

(Continued on next page)
### NEC Corporation

**NEC Corporation**

**Expression5800/R120h-1M**

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

| SPECrate®2017_fp_base = 46.9 | SPECrate®2017_fp_peak = 48.9 |

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**Platform Notes (Continued)**

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

---

**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.

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

---

| 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
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*(Continued on next page)*
## Compiler Version Notes (Continued)

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         | 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, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

```
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.

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.

### Base 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
```
### NEC Corporation

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

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#### 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=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`

**Benchmarks using both Fortran 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`

**Benchmarks using both C and C++:**

- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-mem-layout-trans=4`

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

549.fotonik3d_r: basepeak = yes

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:

521.wrf_r: basepeak = yes

527.cam4_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 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

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

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.

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