# SPEC CPU®2017 Floating Point Speed Result

## NEC Corporation

**NEC Corporation**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jul-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>May-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2019</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9006

**Test Sponsor:** NEC Corporation

**Tested by:** NEC Corporation

### Software

**OS:**
- Red Hat Enterprise Linux Server release 7.7 (Maipo)
- Kernel 3.10.0-1062.1.1.el7.x86_64

**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:**
- Yes

**Firmware:**
- NEC BIOS Version U32 v2.32 03/09/2020 released Jun-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.

### Hardware

**CPU Name:** Intel Xeon Silver 4210R

**Max MHz:** 3200

**Nominal:** 2400

**Enabled:** 20 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:** 13.75 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)

**Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0

**Other:** None

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
<td>90.9</td>
<td>84.1</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
<td>71.6</td>
<td>68.7</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>20</td>
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</tr>
<tr>
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<td>20</td>
<td>77.5</td>
<td>81.3</td>
</tr>
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</tr>
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<td>20</td>
<td>56.8</td>
<td>57.9</td>
</tr>
<tr>
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<td>20</td>
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</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
<td>66.7</td>
<td>115.0</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
<td>67.1</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
<td>72.9</td>
<td>73.0</td>
</tr>
</tbody>
</table>

**Note:** The results are presented as SPECspeed®2017_fp_base = 83.5 and SPECspeed®2017_fp_peak = 84.1.
NEC Corporation

Express5800/R120h-1M (Intel Xeon Silver 4210R)

SPECspeed®2017_fp_base = 83.5

SPECspeed®2017_fp_peak = 84.1

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>91.2</td>
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<td>91.1</td>
<td>182</td>
<td>91.4</td>
<td><strong>183</strong></td>
<td><strong>91.1</strong></td>
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<td>619.lbm_s</td>
<td>20</td>
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<td>73.4</td>
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</tr>
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</table>

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

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

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

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.
### NEC Corporation

**Express5800/R120h-1M (Intel Xeon Silver 4210R)**

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

- **SPECspeed®2017_fp_base = 83.5**
- **SPECspeed®2017_fp_peak = 84.1**

<table>
<thead>
<tr>
<th>CPU2017 License: 9006</th>
<th>Test Date: Jul-2020</th>
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#### Platform Notes

**BIOS Settings:**
- Thermal Configuration: Maximum Cooling
- Workload Profile: General Peak Frequency Compute
- Intel Hyper-Threading: Disabled
- 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
- NUMA Group Size Optimization: Flat

**Sysinfo program /home/cpu2017/bin/sysinfo**

Rev: r6365 of 2019-08-21 295195f888a3d7ed8e6e46a485a0011
running on r120h1m Sun Jul 12 14:42:08 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

**From /proc/cpuinfo**

```
model name : Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
  2  "physical id"s (chips)
  20 "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 : 10
siblings : 10
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

**From lscpu:**

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 20
On-line CPU(s) list: 0-19
Thread(s) per core: 1
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2400.000
```

(Continued on next page)
### NEC Corporation

**Express5800/R120h-1M (Intel Xeon Silver 4210R)**

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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
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#### Platform Notes (Continued)

- **BogoMIPS:** 4800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 14080K
- **NUMA node0 CPU(s):** 0-9
- **NUMA node1 CPU(s):** 10-19
- **Flags:** fpu vme de pse mcr 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 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 epb cat_i3 cdcp_i3 invpcid_single intel_pni intel_pt ssbd mba ibrs ibpb stibp ibrsenhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xsaveopt xsaveic qcmllc qcm_occupy_llc qcm_mbm_total qcm_mbm_local dtherm ida arat pin pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_lld arch_capabilities

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
- **node 0 size:** 196265 MB
- **node 0 free:** 191631 MB
- **node 1 cpus:** 10 11 12 13 14 15 16 17 18 19
- **node 1 size:** 196607 MB
- **node 1 free:** 192156 MB
- **node distances:**
  - **node 0:** 0 1
  - **0:** 10 21
  - **1:** 21 10

From `/proc/meminfo`

- **MemTotal:** 395926444 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

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

- **os-release:**
  - **NAME**="Red Hat Enterprise Linux Server"
  - **VERSION**="7.7 (Maipo)"

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

NEC Corporation

Express5800/R120h-1M (Intel Xeon Silver 4210R)

SPECSpec®2017_fp_base = 83.5
SPECSpec®2017_fp_peak = 84.1

CPU2017 License: 9006
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Platform Notes (Continued)

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 sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Jul 12 14:36
SPEC is set to: /home/cpu2017

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)
Regarding the sysinfo display about the memory speed, the correct configured memory speed is 2400 MT/s. The dmidecode description should be as follows:
NEC Corporation

Express5800/R120h-1M (Intel Xeon Silver 4210R)

SPECspeed®2017_fp_base = 83.5
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CPU2017 License: 9006
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Test Date: Jul-2020
Hardware Availability: May-2020
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Platform Notes (Continued)

24x HPE P03050-091 16 GB 2 rank 2933, configured at 2400

Compiler Version Notes

C
619.lbm_s(base, peak) 638.imagick_s(base, peak)
644.nab_s(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
607.cactuBSSN_s(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
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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
603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
654.roms_s(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
621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(base, peak)

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(Continued on next page)
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Express5800/R120h-1M (Intel Xeon Silver 4210R)

SPECspeed®2017_fp_base = 83.5
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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:
  -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
  -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
  -nostandard-realloc-lhs

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

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

638.imagick_s: basepeak = yes

644.nab_s: Same as 619.lbm_s

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Peak Optimization Flags (Continued)

Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -02 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nstandard-realloc-lhs

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-qopenmp -nstandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -02 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nstandard-realloc-lhs

627.cam4_s: basepeak = yes

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nstandard-realloc-lhs

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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