# SPEC CPU®2017 Floating Point Speed Result

## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Gold 5217)**

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECsspeed®2017_fp_base = 48.6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPECsspeed®2017_fp_peak = 49.3</td>
</tr>
</tbody>
</table>

### Test Information

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

### Hardware

- **CPU Name:** Intel Xeon Gold 5217
- **Max MHz:** 3700
- **Nominal:** 3000
- **Enabled:** 8 cores, 1 chip
- **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
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 2 TB SATA, 7200 RPM, RAID 0
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage.

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)
  - Kernel 3.10.0-957.5.1.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 U30 v2.16 09/12/2019 released Dec-2019
- **File System:** ext4
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

### Performance

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>54.6</td>
<td>49.3</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>38.3</td>
<td>49.7</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>49.7</td>
<td>54.5</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>27.5</td>
<td>45.9</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32.3</td>
<td>47.9</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>60.2</td>
<td>60.2</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>38.4</td>
<td>40.9</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>38.4</td>
<td>41.9</td>
</tr>
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**Threads**: 8

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**NEC Corporation**

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**Results Table**

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<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>321</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>305</td>
<td>54.7</td>
<td>306</td>
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<td>307</td>
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<td>8</td>
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<td>38.3</td>
<td>321</td>
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<tr>
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<td>627.cam4_s</td>
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<td>27.5</td>
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<td>27.5</td>
<td>322</td>
<td>27.5</td>
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<tr>
<td>628.pop2_s</td>
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<td>248</td>
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<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>447</td>
<td>32.3</td>
<td>448</td>
<td>32.3</td>
<td>447</td>
<td>32.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>8</td>
<td>290</td>
<td>60.2</td>
<td>290</td>
<td>60.2</td>
<td>290</td>
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<td>8</td>
<td>223</td>
<td>40.9</td>
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<td>8</td>
<td>411</td>
<td>38.4</td>
<td>410</td>
<td>38.4</td>
<td>411</td>
<td>38.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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.
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Express5800/R120h-2M (Intel Xeon Gold 5217)

SPEC CPU®2017 Floating Point Speed Result

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CPU2017 License: 9006
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Test Date: Feb-2020
Hardware Availability: May-2019
Software Availability: May-2019

SPECspeed®2017_fp_base = 48.6
SPECspeed®2017_fp_peak = 49.3

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
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 295195f888a3d7ed1e6e46a485a0011
running on r120h-2m Sun Feb 23 09:33:04 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 5217 CPU @ 3.00GHz
  1 "physical id"s (chips)
  8 "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 : 8
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): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 1
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) Gold 5217 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 3000.000
BogoMIPS: 6000.00
Virtualization: VT-x

(Continued on next page)
**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Gold 5217)**

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**Test Sponsor:** NEC Corporation  
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**Platform Notes (Continued)**

```
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0–7
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dtsc mpe 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
aperfmpref 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 f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pinn
intel_pt sbbd mba ibrs ibpb stibp ibrs-enhanced tpr_shadow vmmi flexpriority ept
vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdtilt
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsaves xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln
pts pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities
```

/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  
node 0 size: 392737 MB  
node 0 free: 383722 MB  
node distances:  
node 0  
0: 10

From /proc/meminfo  
MemTotal: 395789948 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*  
os-release:  
NAME="Red Hat Enterprise Linux Server"  
VERSION="7.6 (Maipo)"  
ID="rhel"  
ID_LIKE="fedora"  
VARIANT="Server"  
VARIANT_ID="server"  
VERSION_ID="7.6"  
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"

redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
(Continued on next page)
NEC Corporation  
Express5800/R120h-2M (Intel Xeon Gold 5217)  

SPECspeed®2017_fp_base = 48.6  
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CPU2017 License: 9006  
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Platform Notes (Continued)

uname -a:  
Linux r120h-2m 3.10.0-957.5.1.el7.x86_64 #1 SMP Wed Dec 19 10:46:58 EST 2018 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected  
Microarchitectural Data Sampling: No status reported  
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, __user pointer sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Feb 23 09:27

SPEC is set to: /home/cpu2017  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda3 ext4 1.8T 49G 1.7T 3% /

From /sys/devices/virtual/dmi/id  
BIOS: NEC U30 09/12/2019  
Vendor: NEC  
Product: Express5800/R120h-2M  
Serial: JPN828408C

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:  
12x UNKNOWN NOT AVAILABLE  
12x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================  
| C      | 619.llm_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,

(Continued on next page)
NEC Corporation

Express5800/R120h-2M (Intel Xeon Gold 5217)

**SPECSpeed®2017_fp_base = 48.6**

**SPECSpeed®2017_fp_peak = 49.3**

**CPU2017 License:** 9006
**Test Sponsor:** NEC Corporation
**Test Date:** Feb-2020

**Tested by:** NEC Corporation
**Hardware Availability:** May-2019
**Software Availability:** May-2019

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**Compiler Version Notes (Continued)**

Version 19.0.4.227 Build 20190416
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</tr>
<tr>
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<tr>
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**Base Compiler Invocation**

C benchmarks:

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

Fortran benchmarks:

```bash
ifort -m64
```
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## Base Compiler Invocation (Continued)

- 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
```

### 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
```
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CPU2017 License: 9006
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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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-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 -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

(Continued on next page)
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NEC Corporation
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Peak Optimization Flags (Continued)

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

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
-nostandard-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.

Tested with SPEC CPU®2017 v1.1.0 on 2020-02-22 19:33:03-0500.
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