# SPEC® CPU2017 Floating Point Speed Result

**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Bronze 3106)**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>46.7</th>
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<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
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</table>

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (46.7)</th>
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<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>56.7</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>30.0</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>34.4</td>
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<td>58.7</td>
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<td>16</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>52.0</td>
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</table>

## Hardware

**CPU Name:** Intel Xeon Bronze 3106  
**Max MHz.:** 1700  
**Nominal:** 1700  
**Enabled:** 16 cores, 2 chips  
**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:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)  
**Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0  
**Other:** None

## Software

**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
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Results Table

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<th>Ratio</th>
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SPECspeed2017_fp_base = 46.7
SPECspeed2017_fp_peak = 47.5

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"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
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.

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**Platform Notes**

- **BIOS Settings:**
  - Thermal Configuration: Maximum Cooling
  - Workload Profile: General Peak Frequency Compute
  - 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 Thu Oct 25 15:06:59 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

  - From /proc/cpuinfo:
    - model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
    - 2 "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: 8
      - physical 0: cores 0 1 2 3 4 5 6 7
      - physical 1: 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: 1
    - Core(s) per socket: 8
    - Socket(s): 2
    - NUMA node(s): 2
    - Vendor ID: GenuineIntel
    - CPU family: 6
    - Model: 85
    - Model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
    - Stepping: 4
    - CPU MHz: 1700.000
    - BogoMIPS: 3400.00
    - Virtualization: VT-x

(Continued on next page)
Platform Notes (Continued)

```
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             11264K
NUMA node0 CPU(s):    0-3,8-11
NUMA node1 CPU(s):    4-7,12-15
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 rdtsscp
 lm constant_tsc art arch_perfmon pebs bts rep_good nopl apic pedit dtes64
 monitor ds_cpl vmx smx est tm2 ssse3 fma
 cx16 xtpr pdcm pcid dca sse4_1 lse4_2 x2apic movbe popcnt tsc_deadline_timer aes
 xsave avx f16c rdrand lahf_lm abm 3dnowprefetch pdm cat_13 cdg_13 invpcid_single
 intel_pt spec_ctrl ibpib_support tpr_shadow vnmi flexpriority ept vpid fsgsbase
 tsc_adjust bmi1 hle avx2 smep bmi2 2sms 2msm ccm xipcm xipcm_tpr cmip ccm_occup_llc
 ccm_mbm_total ccm_mbm_local dtmtherm 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 8 9 10 11
node 0 size: 196268 MB
node 0 free: 191722 MB
node 1 cpus: 4 5 6 7 12 13 14 15
node 1 size: 196607 MB
node 1 free: 192128 MB
node distances:
  node 0 1
  0: 10 21
  1: 21 10
```

From `/proc/meminfo`

```
MemTotal: 395932148 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

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"
```

(Continued on next page)
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Platform Notes (Continued)

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
ox86_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 Oct 25 15:01

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 630G 233G 74% /

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, configured at 2133

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

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CC  619.lbm_s(peak)
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icc (ICC) 18.0.2 20180210
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Compiler Version Notes (Continued)

==============================================================================
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.

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

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

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

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

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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 -gopenmp -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 -gopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

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

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Base Optimization Flags (Continued)

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
644.nab_s: basepeak = yes

Fortran benchmarks:

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

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ip0 -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs

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 2018-10-25 02:06:57-0400.