



# SPEC® CPU2017 Floating Point Speed Result

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## NEC Corporation

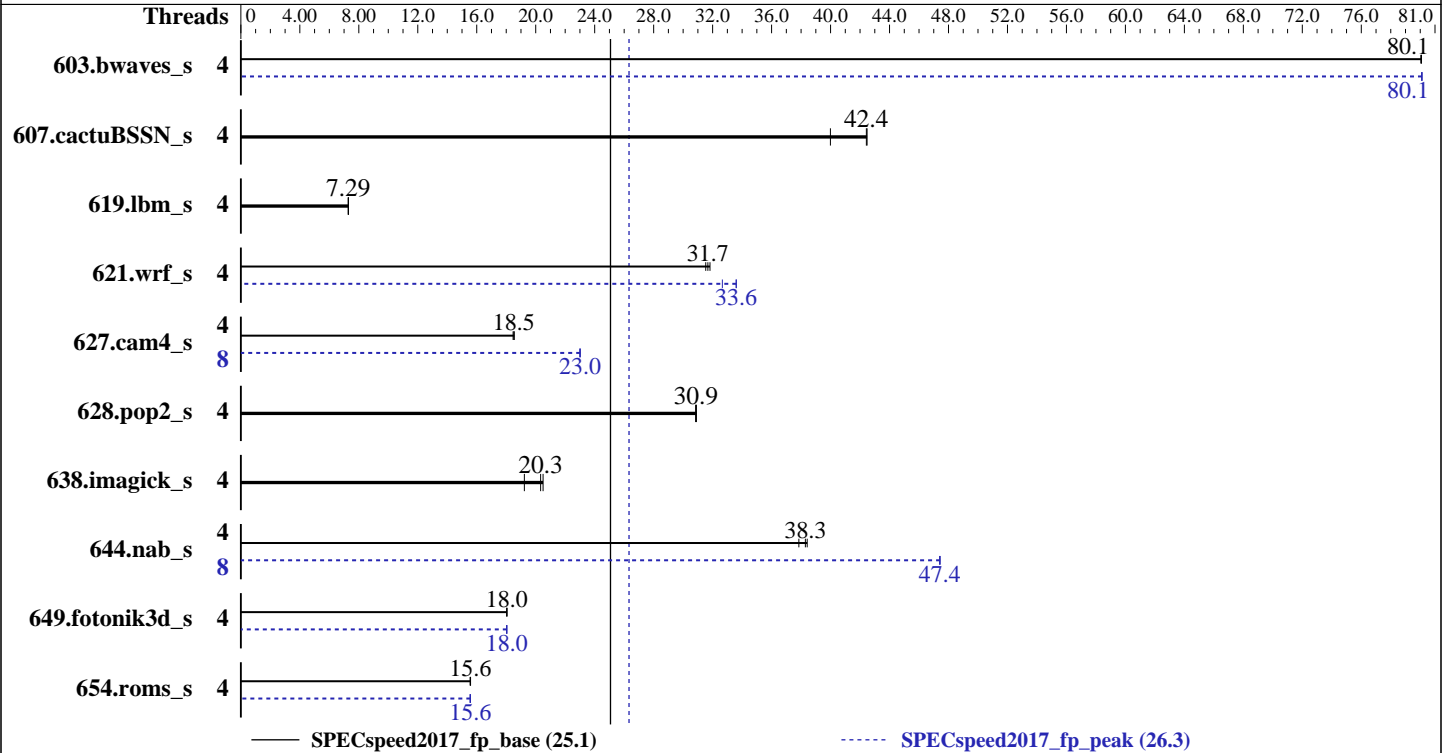
SPECspeed2017\_fp\_base = 25.1

### Express5800/R110j-1 (Intel Xeon E-2174G)

SPECspeed2017\_fp\_peak = 26.3

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

Test Date: Nov-2018  
Hardware Availability: Jan-2019  
Software Availability: Aug-2018



### Hardware

CPU Name: Intel Xeon E-2174G  
Max MHz.: 4700  
Nominal: 3800  
Enabled: 4 cores, 1 chip, 2 threads/core  
Orderable: 1 chip  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 256 KB I+D on chip per core  
L3: 8 MB I+D on chip per chip  
Other: None  
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)  
Storage: 1 x 600 GB SAS, 15000 RPM, RAID 0  
Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.5 (Maipo)  
Kernel 3.10.0-862.11.6.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 U43 10/02/2018 released Dec-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

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	4	737	80.1	<b><u>737</u></b>	<b><u>80.1</u></b>	737	80.0	4	736	80.1	737	80.1	<b><u>736</u></b>	<b><u>80.1</u></b>
607.cactuBSSN_s	4	392	42.5	417	40.0	<b><u>393</u></b>	<b><u>42.4</u></b>	4	392	42.5	417	40.0	<b><u>393</u></b>	<b><u>42.4</u></b>
619.lbm_s	4	719	7.28	718	7.30	<b><u>718</u></b>	<b><u>7.29</u></b>	4	719	7.28	718	7.30	<b><u>718</u></b>	<b><u>7.29</u></b>
621.wrf_s	4	<b><u>418</u></b>	<b><u>31.7</u></b>	416	31.8	419	31.5	4	405	32.7	394	33.6	<b><u>394</u></b>	<b><u>33.6</u></b>
627.cam4_s	4	<b><u>478</u></b>	<b><u>18.5</u></b>	478	18.5	480	18.5	8	385	23.0	385	23.0	<b><u>385</u></b>	<b><u>23.0</u></b>
628.pop2_s	4	<b><u>385</u></b>	<b><u>30.9</u></b>	385	30.9	384	30.9	4	<b><u>385</u></b>	<b><u>30.9</u></b>	385	30.9	384	30.9
638.imagick_s	4	750	19.2	704	20.5	<b><u>709</u></b>	<b><u>20.3</u></b>	4	750	19.2	704	20.5	<b><u>709</u></b>	<b><u>20.3</u></b>
644.nab_s	4	455	38.4	462	37.8	<b><u>456</u></b>	<b><u>38.3</u></b>	8	369	47.4	<b><u>369</u></b>	<b><u>47.4</u></b>	368	47.4
649.fotonik3d_s	4	<b><u>505</u></b>	<b><u>18.0</u></b>	505	18.0	505	18.0	4	506	18.0	505	18.0	<b><u>505</u></b>	<b><u>18.0</u></b>
654.roms_s	4	<b><u>1011</u></b>	<b><u>15.6</u></b>	1012	15.6	1011	15.6	4	1012	15.6	<b><u>1012</u></b>	<b><u>15.6</u></b>	1012	15.6

SPECspeed2017\_fp\_base = 25.1

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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,1,0"

LD\_LIBRARY\_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

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.

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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## Platform Notes

### BIOS Settings:

Thermal Configuration: Maximum Cooling  
Workload Profile: Custom  
Intel Virtualization Technology (Intel VT): Disabled  
Energy Efficient Turbo: Disabled  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on r110j1 Fri Nov 16 19:34:02 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) E-2174G CPU @ 3.80GHz
 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      : 4
siblings       : 8
physical 0:    cores 0 1 2 3
```

### 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:  2
Core(s) per socket:  4
Socket(s):       1
NUMA node(s):    1
Vendor ID:       GenuineIntel
CPU family:      6
Model:           158
Model name:      Intel(R) Xeon(R) E-2174G CPU @ 3.80GHz
Stepping:        10
CPU MHz:         4282.421
CPU max MHz:     4700.0000
CPU min MHz:     800.0000
BogoMIPS:        7584.00
Virtualization:  VT-x
L1d cache:      32K
L1i cache:      32K
L2 cache:       256K
L3 cache:       8192K
```

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## Platform Notes (Continued)

```
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 dts acpi 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
aperfmpperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 sse3 sdbg
fma cx16 xtpr pdcml cid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx fl6c rdrand lahf_lm abm 3dnowprefetch ept intel_pt ssbd ibrs ibpb stibp
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida
arat pln pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_l1d
```

```
/proc/cpuinfo cache data
cache size : 8192 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: 65386 MB
node 0 free: 63481 MB
node distances:
node 0
0: 10
```

```
From /proc/meminfo
MemTotal:      65821576 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.5 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.5"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.5 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server
```

```
uname -a:
Linux r110j1 3.10.0-862.11.6.el7.x86_64 #1 SMP Fri Aug 10 16:55:11 UTC 2018 x86_64
x86_64 x86_64 GNU/Linux
```

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## Platform Notes (Continued)

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Mitigation: PTI  
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, \_\_user pointer sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Nov 16 19:28

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda3	ext4	542G	90G	425G	18%	/

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 U43 10/02/2018

Memory:

2x HPE 879527-091 16 GB 2 rank 2666, configured at 2667  
2x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2667

(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.  
=====

=====  
CC 619.lbm\_s(peak)  
=====

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

=====  
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  
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### Compiler Version Notes (Continued)

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.

=====  
FC 603.bwaves\_s(peak) 649.fotonik3d\_s(peak)

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 621.wrf\_s(base) 627.cam4\_s(base, peak) 628.pop2\_s(base)

ifort (IFORT) 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.

=====  
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

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## Base Compiler Invocation (Continued)

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:

```
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
```

Benchmarks using both Fortran 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
```

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
```



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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:

```
619.lbm_s: basepeak = yes
```

```
638.imagick_s: basepeak = yes
```

```
644.nab_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp  
-DSPEC_OPENMP
```

Fortran benchmarks:

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

```
649.fotonik3d_s: Same as 603.bwaves_s
```

```
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
```

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## Peak Optimization Flags (Continued)

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: basepeak = yes
```

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/Intel-ic18.0-official-linux64.2017-12-21.html>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-R110j-RevC.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-R110j-RevC.xml>

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