



SPEC CPU®2017 Floating Point Speed Result

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NEC Corporation

SPECspeed®2017_fp_base = 100

Express5800/R120h-1M (Intel Xeon Gold 6234)

SPECspeed®2017_fp_peak = 101

CPU2017 License: 9006

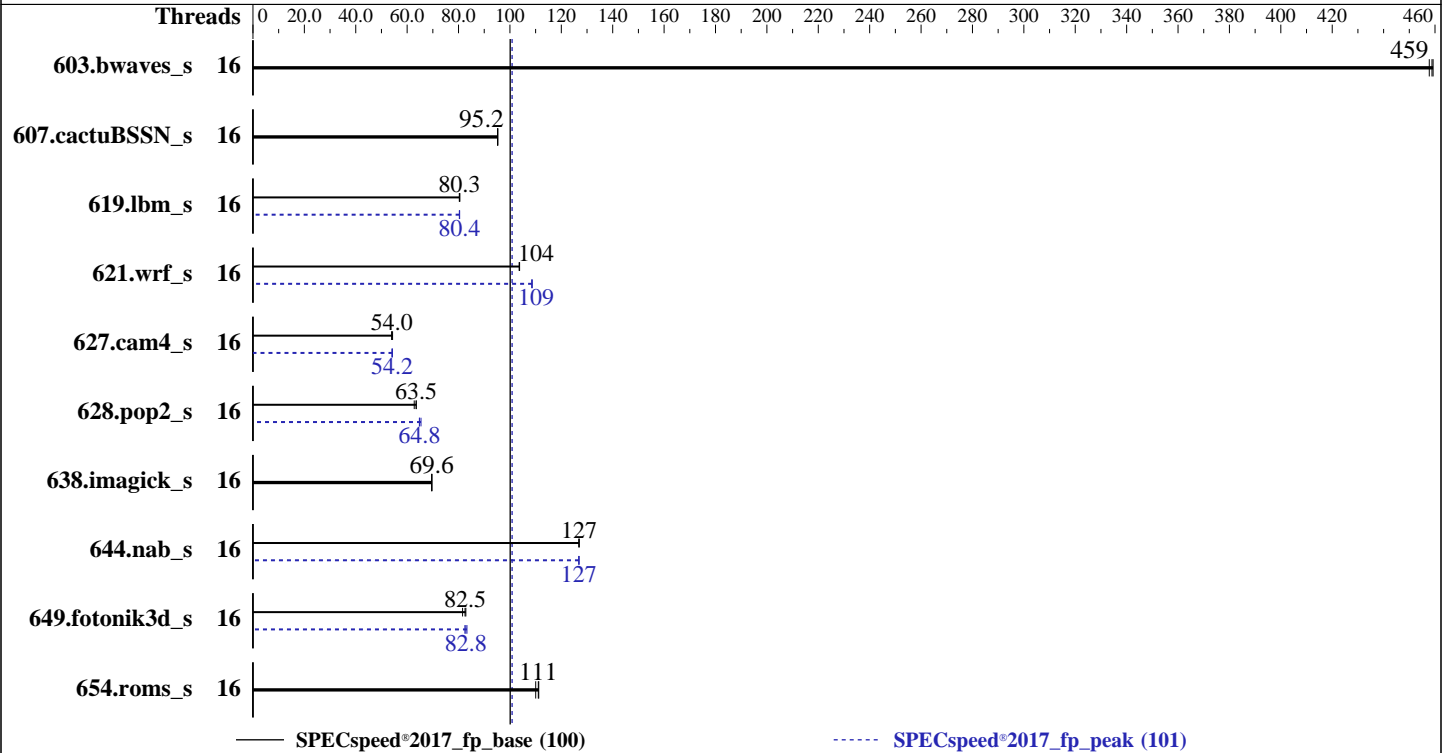
Test Sponsor: NEC Corporation

Tested by: NEC Corporation

Test Date: Jun-2020

Hardware Availability: Dec-2019

Software Availability: Sep-2019



Hardware

CPU Name: Intel Xeon Gold 6234
 Max MHz: 4000
 Nominal: 3300
 Enabled: 16 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: 24.75 MB I+D on chip per chip
 Other: None
 Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)
 Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0
 Other: None

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 v2.22 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.



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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	16	128	459	<u>129</u>	<u>459</u>	129	458	16	128	459	<u>129</u>	<u>459</u>	129	458
607.cactuBSSN_s	16	175	95.2	<u>175</u>	<u>95.2</u>	175	95.3	16	175	95.2	<u>175</u>	<u>95.2</u>	175	95.3
619.lbm_s	16	<u>65.2</u>	<u>80.3</u>	65.0	80.5	65.2	80.3	16	65.1	80.4	<u>65.2</u>	<u>80.4</u>	65.2	80.3
621.wrf_s	16	127	104	<u>128</u>	<u>104</u>	128	104	16	<u>122</u>	<u>109</u>	122	109	122	109
627.cam4_s	16	164	54.0	163	54.3	<u>164</u>	<u>54.0</u>	16	<u>164</u>	<u>54.2</u>	164	54.1	163	54.3
628.pop2_s	16	187	63.5	<u>187</u>	<u>63.5</u>	189	62.8	16	<u>183</u>	<u>64.8</u>	182	65.4	183	64.8
638.imagick_s	16	207	69.6	<u>207</u>	<u>69.6</u>	207	69.6	16	207	69.6	<u>207</u>	<u>69.6</u>	207	69.6
644.nab_s	16	138	127	<u>138</u>	<u>127</u>	138	127	16	138	127	138	127	<u>138</u>	<u>127</u>
649.fotonik3d_s	16	110	82.8	<u>110</u>	<u>82.5</u>	112	81.6	16	111	82.5	<u>110</u>	<u>82.8</u>	109	83.3
654.roms_s	16	142	111	<u>142</u>	<u>111</u>	143	110	16	142	111	<u>142</u>	<u>111</u>	143	110

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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"

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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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 295195f888a3d7edble6e46a485a0011
 running on r120h1m Sun Jun 7 21:40:09 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 6234 CPU @ 3.30GHz
 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 2 8 9 17 18 19 20 27
physical 1: cores 2 3 4 8 9 20 25 27
```

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) Gold 6234 CPU @ 3.30GHz
Stepping:               7
CPU MHz:                3300.000
```

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Platform Notes (Continued)

BogoMIPS: 6600.00
 Virtualization: VT-x
 L1d cache: 32K
 L1i cache: 32K
 L2 cache: 1024K
 L3 cache: 25344K
 NUMA node0 CPU(s): 0-7
 NUMA node1 CPU(s): 8-15

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 art 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 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single
 intel_ppin intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced 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 xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
 dtherm ida arat pln pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp
 flush_lld arch_capabilities

```

/proc/cpuinfo cache data
cache size : 25344 KB
  
```

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
node 0 size: 196264 MB
node 0 free: 191702 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 196607 MB
node 1 free: 192091 MB
node distances:
node  0  1
  0:  10  21
  1:  21  10
  
```

```

From /proc/meminfo
MemTotal: 395926536 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
  
```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.7 (Maipo)"
  
```

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

```
run-level 3 Jun 7 21:34
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       ext4  908G  154G  709G  18% /
```

```
From /sys/devices/virtual/dmi/id
BIOS: NEC U32 11/13/2019
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)



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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)
=====

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,
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=====



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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:

```
-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
```

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Base Optimization Flags (Continued)

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
```

Fortran benchmarks:

```
603.bwaves_s: basepeak = yes
```

(Continued on next page)



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Peak Optimization Flags (Continued)

```
649.fotonik3d_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
```

654.roms_s: basepeak = yes

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
```

```
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++:

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-ic19.0u1-official-linux64.2019-07-09.html>

<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/Intel-ic19.0u1-official-linux64.2019-07-09.xml>

<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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