



# SPEC® CPU2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

Synergy 660 Gen10

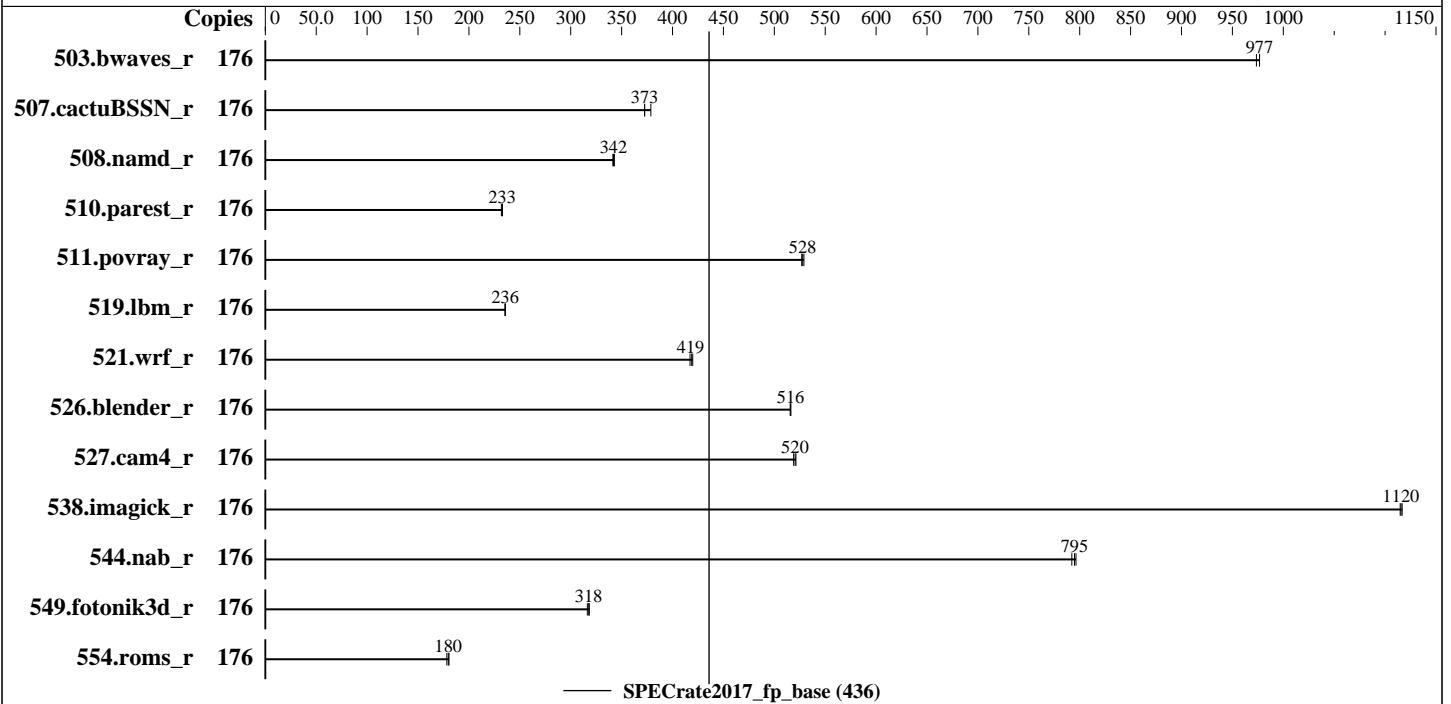
(2.10 GHz, Intel Xeon Gold 6238M)

SPECrate2017\_fp\_base = 436

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE

Test Date: May-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019



### Hardware

CPU Name: Intel Xeon Gold 6238M  
Max MHz.: 3700  
Nominal: 2100  
Enabled: 88 cores, 4 chips, 2 threads/core  
Orderable: 2, 4 chip(s)  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 30.25 MB I+D on chip per chip  
Other: None  
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 480 GB SATA SSD, RAID 0  
Other: None

### Software

OS: SUSE Linux Enterprise Server 15 (x86\_64)  
Kernel 4.12.14-23-default  
Compiler: C/C++: Version 19.0.2.187 of Intel C/C++  
Compiler Build 20190117 for Linux;  
Fortran: Version 19.0.2.187 of Intel Fortran  
Compiler Build 20190117 for Linux  
Parallel: No  
Firmware: HPE BIOS Version I43 02/02/2019 released Apr-2019  
File System: btrfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	176	1807	977	<b>1807</b>	<b>977</b>	1813	974							
507.cactuBSSN_r	176	598	373	<b>598</b>	<b>373</b>	588	379							
508.namd_r	176	490	341	488	343	<b>489</b>	<b>342</b>							
510.parest_r	176	1985	232	<b>1978</b>	<b>233</b>	1976	233							
511.povray_r	176	777	529	780	527	<b>778</b>	<b>528</b>							
519.lbm_r	176	<b>787</b>	<b>236</b>	787	236	787	236							
521.wrf_r	176	<b>941</b>	<b>419</b>	945	417	939	420							
526.blender_r	176	<b>519</b>	<b>516</b>	520	516	519	516							
527.cam4_r	176	591	521	593	519	<b>592</b>	<b>520</b>							
538.imagick_r	176	393	1110	392	1120	<b>392</b>	<b>1120</b>							
544.nab_r	176	372	796	<b>373</b>	<b>795</b>	374	792							
549.fotonik3d_r	176	2155	318	<b>2159</b>	<b>318</b>	2168	316							
554.roms_r	176	1550	180	<b>1556</b>	<b>180</b>	1569	178							

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

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"  
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  
runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <etc>

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017\_u2/lib/ia32:/home/cpu2017\_u2/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)



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## General Notes (Continued)

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.

## Platform Notes

BIOS Configuration:

Thermal Configuration set to Maximum Cooling

Memory Patrol Scrubbing set to Disabled

LLC Prefetch set to Enabled

LLC Dead Line Allocation set to Disabled

Enhanced Processor Performance set to Enabled

Workload Profile set to General Throughput Compute

Workload Profile set to Custom

Energy/Performance Bias set to Balanced Performance

Sysinfo program /home/cpu2017\_u2/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on sy660-gen10 Wed May 29 23:44:30 2019

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 6238M CPU @ 2.10GHz

4 "physical id"s (chips)

176 "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 : 22

siblings : 44

physical 0: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

physical 1: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

physical 2: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

physical 3: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 176

On-line CPU(s) list: 0-175

Thread(s) per core: 2

Core(s) per socket: 22

Socket(s): 4

(Continued on next page)



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## Platform Notes (Continued)

```

NUMA node(s):      8
Vendor ID:         GenuineIntel
CPU family:        6
Model:             85
Model name:        Intel(R) Xeon(R) Gold 6238M CPU @ 2.10GHz
Stepping:          7
CPU MHz:           2100.000
BogoMIPS:          4200.00
Virtualization:    VT-x
L1d cache:         32K
L1i cache:         32K
L2 cache:          1024K
L3 cache:          30976K
NUMA node0 CPU(s): 0-10,88-98
NUMA node1 CPU(s): 11-21,99-109
NUMA node2 CPU(s): 22-32,110-120
NUMA node3 CPU(s): 33-43,121-131
NUMA node4 CPU(s): 44-54,132-142
NUMA node5 CPU(s): 55-65,143-153
NUMA node6 CPU(s): 66-76,154-164
NUMA node7 CPU(s): 77-87,165-175
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 cpuid
aperfmpperf tsc_known_freq 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 cpuid_fault
epb cat_l3 cdp_l3 invpcid_single intel_ppin mba tpr_shadow vnmi flexpriority ept
vpid fsgsbase tsc_adjust bml hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

```

```

/proc/cpuinfo cache data
cache size : 30976 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 88 89 90 91 92 93 94 95 96 97 98
node 0 size: 96277 MB
node 0 free: 95891 MB
node 1 cpus: 11 12 13 14 15 16 17 18 19 20 21 99 100 101 102 103 104 105 106 107 108
109
node 1 size: 96763 MB
node 1 free: 96558 MB
node 2 cpus: 22 23 24 25 26 27 28 29 30 31 32 110 111 112 113 114 115 116 117 118 119

```

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## Platform Notes (Continued)

```

120
node 2 size: 96763 MB
node 2 free: 96596 MB
node 3 cpus: 33 34 35 36 37 38 39 40 41 42 43 121 122 123 124 125 126 127 128 129 130
131
node 3 size: 96763 MB
node 3 free: 96550 MB
node 4 cpus: 44 45 46 47 48 49 50 51 52 53 54 132 133 134 135 136 137 138 139 140 141
142
node 4 size: 96763 MB
node 4 free: 96636 MB
node 5 cpus: 55 56 57 58 59 60 61 62 63 64 65 143 144 145 146 147 148 149 150 151 152
153
node 5 size: 96763 MB
node 5 free: 96600 MB
node 6 cpus: 66 67 68 69 70 71 72 73 74 75 76 154 155 156 157 158 159 160 161 162 163
164
node 6 size: 96763 MB
node 6 free: 96639 MB
node 7 cpus: 77 78 79 80 81 82 83 84 85 86 87 165 166 167 168 169 170 171 172 173 174
175
node 7 size: 96525 MB
node 7 free: 96393 MB
node distances:
node  0  1  2  3  4  5  6  7
  0: 10 21 31 31 31 31 31 31
  1: 21 10 31 31 31 31 31 31
  2: 31 31 10 21 31 31 31 31
  3: 31 31 21 10 31 31 31 31
  4: 31 31 31 31 10 21 31 31
  5: 31 31 31 31 21 10 31 31
  6: 31 31 31 31 31 31 10 21
  7: 31 31 31 31 31 31 21 10

```

```

From /proc/meminfo
MemTotal:      791946036 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15"
VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"

```

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## Platform Notes (Continued)

ANSI\_COLOR="0;32"

CPE\_NAME="cpe:/o:suse:sles:15"

uname -a:

```
Linux sy660-gen10 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected

CVE-2017-5753 (Spectre variant 1): Mitigation: \_\_user pointer sanitization

CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS\_FW

run-level 3 May 29 23:44

SPEC is set to: /home/cpu2017\_u2

```
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sdb2       btrfs    445G  115G  330G  26% /home
```

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 HPE I43 02/02/2019

Memory:

24x UNKNOWN NOT AVAILABLE

24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

```
=====  
CC 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)  
-----
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
-----
```

```
=====  
CXXC 508.namd_r(base) 510.parest_r(base)  
-----
```

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117
```

(Continued on next page)



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## Compiler Version Notes (Continued)

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(base) 526.blender\_r(base)  
=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
FC 507.cactuBSSN\_r(base)  
=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
FC 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)  
=====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.2.187 Build 20190117

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====  
CC 521.wrf\_r(base) 527.cam4\_r(base)  
=====

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.2.187 Build 20190117

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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## Base Compiler Invocation

C benchmarks:

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

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## Base Portability Flags

```
503.bwaves_r: -DSPEC_LP64
```

```
507.cactuBSSN_r: -DSPEC_LP64
```

```
508.namd_r: -DSPEC_LP64
```

```
510.parest_r: -DSPEC_LP64
```

```
511.povray_r: -DSPEC_LP64
```

```
519.lbm_r: -DSPEC_LP64
```

```
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
```

```
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
```

```
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
```

```
538.imagick_r: -DSPEC_LP64
```

```
544.nab_r: -DSPEC_LP64
```

```
549.fotonik3d_r: -DSPEC_LP64
```

```
554.roms_r: -DSPEC_LP64
```

## Base Optimization Flags

C benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
```

(Continued on next page)





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## Base Optimization Flags (Continued)

C++ benchmarks (continued):

-qopt-mem-layout-trans=4

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs

-align array32byte

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs

-align array32byte

Benchmarks using both C and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs

-align array32byte

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.html>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml>

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