



SPEC® CPU2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

Synergy 660 Gen10

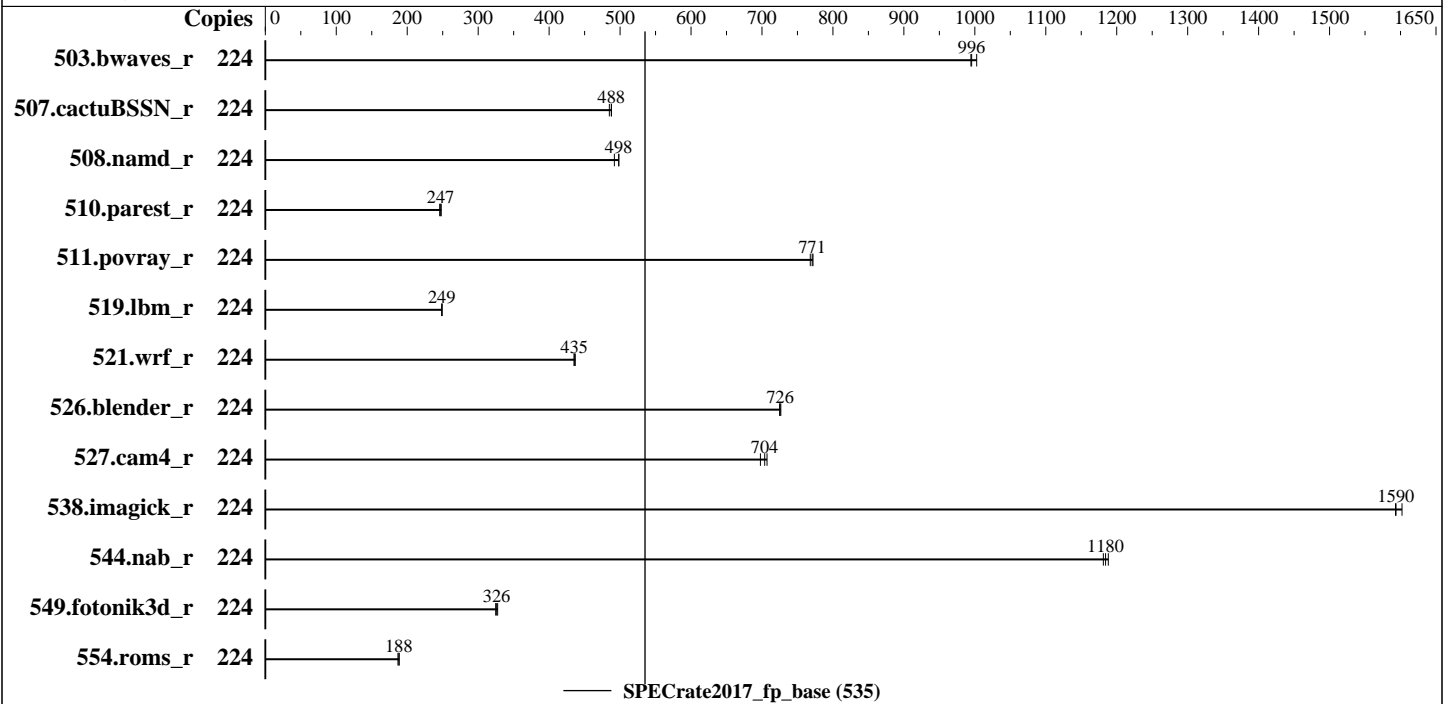
(2.70 GHz, Intel Xeon Platinum 8280)

SPECrate2017_fp_base = 535

SPECrate2017_fp_peak = Not Run

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

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



Hardware

CPU Name: Intel Xeon Platinum 8280
Max MHz.: 4000
Nominal: 2700
Enabled: 112 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: 38.5 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 20190131 for Linux;
Fortran: Version 19.0.2.187 of Intel Fortran
Compiler Build 20190131 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	224	2259	995	2240	1000	<u>2256</u>	<u>996</u>							
507.cactuBSSN_r	224	585	485	581	488	<u>582</u>	<u>488</u>							
508.namd_r	224	427	498	<u>427</u>	<u>498</u>	433	492							
510.parest_r	224	2385	246	2364	248	<u>2371</u>	<u>247</u>							
511.povray_r	224	<u>679</u>	<u>771</u>	678	772	681	768							
519.lbm_r	224	949	249	<u>949</u>	<u>249</u>	948	249							
521.wrf_r	224	<u>1152</u>	<u>435</u>	1148	437	1153	435							
526.blender_r	224	471	725	470	727	<u>470</u>	<u>726</u>							
527.cam4_r	224	561	698	<u>557</u>	<u>704</u>	554	707							
538.imagick_r	224	<u>350</u>	<u>1590</u>	350	1590	348	1600							
544.nab_r	224	<u>318</u>	<u>1180</u>	319	1180	317	1190							
549.fotonik3d_r	224	<u>2677</u>	<u>326</u>	2666	327	2689	325							
554.roms_r	224	1886	189	1904	187	<u>1891</u>	<u>188</u>							

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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

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

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General Notes (Continued)

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.

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
Advanced Memory Protection set to AdvancedECC

Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sy660-gen10 Mon Mar 4 05:05:08 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) Platinum 8280 CPU @ 2.70GHz
4 "physical id"s (chips)
224 "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 : 28
siblings  : 56
physical 0: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29
30
physical 1: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29
30
physical 2: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29
30
physical 3: cores 0 1 2 3 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29
30
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
```

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Platform Notes (Continued)

```

Byte Order:           Little Endian
CPU(s):              224
On-line CPU(s) list: 0-223
Thread(s) per core:  2
Core(s) per socket: 28
Socket(s):           4
NUMA node(s):        8
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz
Stepping:             6
CPU MHz:              2700.000
BogoMIPS:             5400.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             39424K
NUMA node0 CPU(s):   0-13,112-125
NUMA node1 CPU(s):   14-27,126-139
NUMA node2 CPU(s):   28-41,140-153
NUMA node3 CPU(s):   42-55,154-167
NUMA node4 CPU(s):   56-69,168-181
NUMA node5 CPU(s):   70-83,182-195
NUMA node6 CPU(s):   84-97,196-209
NUMA node7 CPU(s):   98-111,210-223
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 : 39424 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 11 12 13 112 113 114 115 116 117 118 119 120 121
122 123 124 125
```

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Platform Notes (Continued)

```

node 0 size: 96275 MB
node 0 free: 95781 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 126 127 128 129 130 131 132 133
134 135 136 137 138 139
node 1 size: 96762 MB
node 1 free: 96447 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 140 141 142 143 144 145 146 147
148 149 150 151 152 153
node 2 size: 96762 MB
node 2 free: 96614 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 154 155 156 157 158 159 160 161
162 163 164 165 166 167
node 3 size: 96762 MB
node 3 free: 96624 MB
node 4 cpus: 56 57 58 59 60 61 62 63 64 65 66 67 68 69 168 169 170 171 172 173 174 175
176 177 178 179 180 181
node 4 size: 96733 MB
node 4 free: 96595 MB
node 5 cpus: 70 71 72 73 74 75 76 77 78 79 80 81 82 83 182 183 184 185 186 187 188 189
190 191 192 193 194 195
node 5 size: 96762 MB
node 5 free: 96420 MB
node 6 cpus: 84 85 86 87 88 89 90 91 92 93 94 95 96 97 196 197 198 199 200 201 202 203
204 205 206 207 208 209
node 6 size: 96762 MB
node 6 free: 96615 MB
node 7 cpus: 98 99 100 101 102 103 104 105 106 107 108 109 110 111 210 211 212 213 214
215 216 217 218 219 220 221 222 223
node 7 size: 96552 MB
node 7 free: 96430 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: 791935976 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

```

From /etc/*release* /etc/*version*

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Platform Notes (Continued)

```
os-release:
  NAME="SLES"
  VERSION="15"
  VERSION_ID="15"
  PRETTY_NAME="SUSE Linux Enterprise Server 15"
  ID="sles"
  ID_LIKE="suse"
  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 Mar 4 05:04
```

```
SPEC is set to: /home/cpu2017_u2
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb2       btrfs 445G   81G  364G  19% /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.
```

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Compiler Version Notes (Continued)

=====
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
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,
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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,
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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)

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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
```




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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  
-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-Platform-Flags-Intel-V1.2-CLX-revA.html>

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-03.html>

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

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-03.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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