



# SPEC® CPU2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL560 Gen10

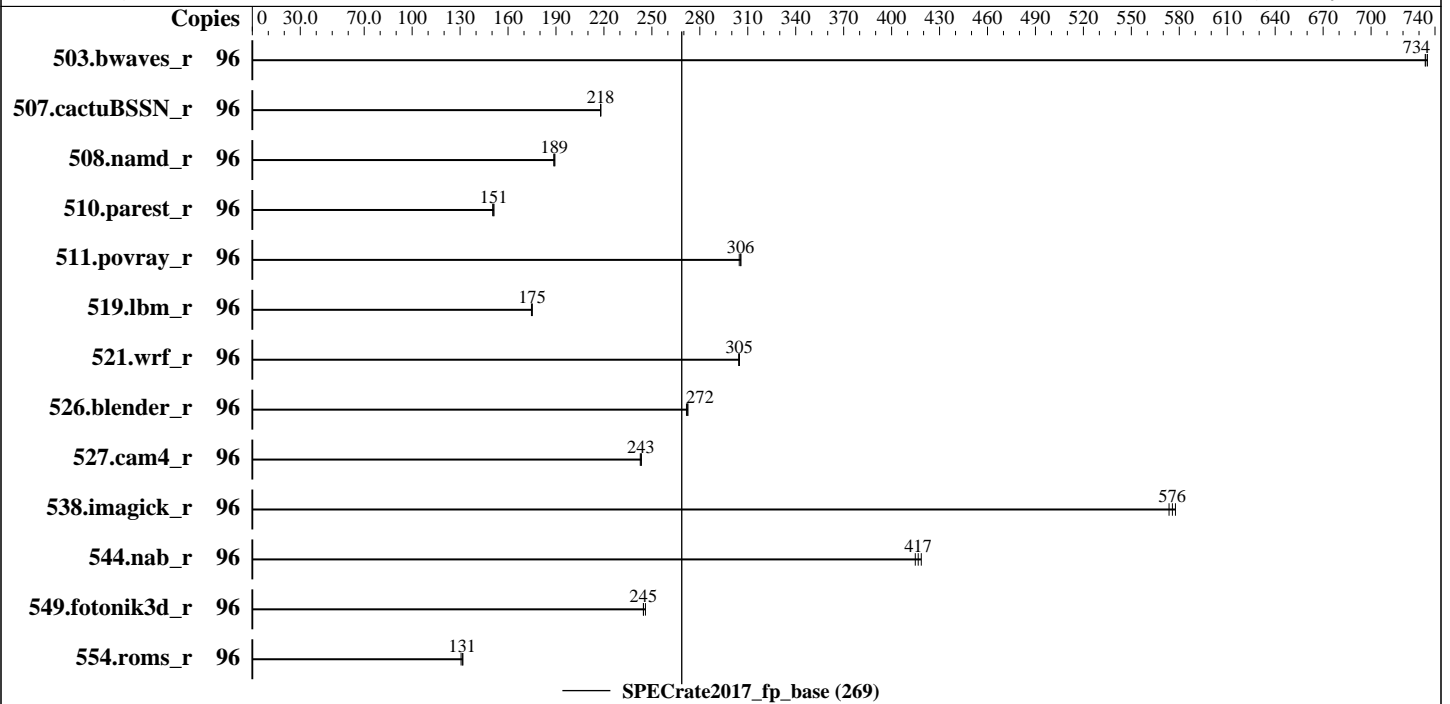
(2.30 GHz, Intel Xeon Gold 5118)

SPECrate2017\_fp\_base = 269

SPECrate2017\_fp\_peak = Not Run

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

Test Date: Jul-2018  
Hardware Availability: Jun-2018  
Software Availability: May-2018



## Hardware

CPU Name: Intel Xeon Gold 5118  
Max MHz.: 3200  
Nominal: 2300  
Enabled: 48 cores, 4 chips, 2 threads/core  
Orderable: 1,2,4 chip (s)  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 16.5 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 x 32 GB 2Rx8 PC4-2666V-R, running at 2400)  
Storage: 2 x 400 GB SSD SATA, RAID 1  
Other: None

## Software

OS: SUSE Linux Enterprise Server 12 (x86\_64) SP3  
Kernel 4.4.132-94.33-default  
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: No  
Firmware: HPE BIOS Version U34 06/15/2018 released Jun-2018  
File System: xfs  
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	96	1309	735	<b><u>1311</u></b>	<b><u>734</u></b>	1312	734							
507.cactuBSSN_r	96	<b><u>558</u></b>	<b><u>218</u></b>	558	218	557	218							
508.namd_r	96	482	189	<b><u>483</u></b>	<b><u>189</u></b>	484	189							
510.parest_r	96	1670	150	<b><u>1663</u></b>	<b><u>151</u></b>	1662	151							
511.povray_r	96	736	305	733	306	<b><u>734</u></b>	<b><u>306</u></b>							
519.lbm_r	96	578	175	<b><u>578</u></b>	<b><u>175</u></b>	579	175							
521.wrf_r	96	707	304	<b><u>706</u></b>	<b><u>305</u></b>	706	305							
526.blender_r	96	537	272	538	272	<b><u>537</u></b>	<b><u>272</u></b>							
527.cam4_r	96	692	243	<b><u>691</u></b>	<b><u>243</u></b>	690	243							
538.imagick_r	96	416	574	413	578	<b><u>415</u></b>	<b><u>576</u></b>							
544.nab_r	96	386	419	<b><u>388</u></b>	<b><u>417</u></b>	389	415							
549.fotonik3d_r	96	1521	246	<b><u>1529</u></b>	<b><u>245</u></b>	1529	245							
554.roms_r	96	1158	132	1168	131	<b><u>1161</u></b>	<b><u>131</u></b>							

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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>  
IRQ balance service was stopped using "systemctl stop irqbalance.service"  
Tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"  
Numa Balancing disabled using "echo 0 > /proc/sys/kernel/numa\_balancing"  
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty\_ratio"  
Speculative Store Bypass (CVE-2018-3639) mitigation was disabled system-wide via kernel boot parameter "spec\_store\_bypass\_disable=off"



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## General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
```

Binaries compiled on a system with 1x Intel Core i7-6700K 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) 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:

Workload Profile set to General Throughput Compute

Thermal Configuration set to Maximum Cooling

LLC Dead Line Allocation set to Disabled

Stale A to S set to Enabled

LLC Prefetch set to Enabled

Memory Patrol Scrubbing set to Disabled

Minimum Processor Idle Power Core C-State set to C1E

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on dl560gen10-1 Thu Jul 19 13:37:58 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) Gold 5118 CPU @ 2.30GHz
```

```
4 "physical id"s (chips)
```

```
96 "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 : 12
```

```
siblings : 24
```

```
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

```
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

```
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

```
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

From lscpu:

```
Architecture: x86_64
```

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## Platform Notes (Continued)

```

CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              96
On-line CPU(s) list: 0-95
Thread(s) per core:  2
Core(s) per socket: 12
Socket(s):           4
NUMA node(s):        8
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Gold 5118 CPU @ 2.30GHz
Stepping:             4
CPU MHz:              2294.621
BogoMIPS:             4589.24
Virtualization:       VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            16896K
NUMA node0 CPU(s):   0-5,48-53
NUMA node1 CPU(s):   6-11,54-59
NUMA node2 CPU(s):   12-17,60-65
NUMA node3 CPU(s):   18-23,66-71
NUMA node4 CPU(s):   24-29,72-77
NUMA node5 CPU(s):   30-35,78-83
NUMA node6 CPU(s):   36-41,84-89
NUMA node7 CPU(s):   42-47,90-95

```

```

Flags:                fpv 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 ssse3 sdbg
fma cx16 xtpr pdc m dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke

```

```

/proc/cpuinfo cache data
cache size : 16896 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 48 49 50 51 52 53
node 0 size: 193033 MB

```

(Continued on next page)



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## Platform Notes (Continued)

```

node 0 free: 192763 MB
node 1 cpus: 6 7 8 9 10 11 54 55 56 57 58 59
node 1 size: 193533 MB
node 1 free: 193287 MB
node 2 cpus: 12 13 14 15 16 17 60 61 62 63 64 65
node 2 size: 193533 MB
node 2 free: 193430 MB
node 3 cpus: 18 19 20 21 22 23 66 67 68 69 70 71
node 3 size: 193533 MB
node 3 free: 193433 MB
node 4 cpus: 24 25 26 27 28 29 72 73 74 75 76 77
node 4 size: 193533 MB
node 4 free: 193428 MB
node 5 cpus: 30 31 32 33 34 35 78 79 80 81 82 83
node 5 size: 193533 MB
node 5 free: 193428 MB
node 6 cpus: 36 37 38 39 40 41 84 85 86 87 88 89
node 6 size: 193533 MB
node 6 free: 193405 MB
node 7 cpus: 42 43 44 45 46 47 90 91 92 93 94 95
node 7 size: 193390 MB
node 7 free: 193252 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:      1584770728 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

/usr/bin/lsb\_release -d

SUSE Linux Enterprise Server 12 SP3

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

SuSE-release:

```

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 3

```

# This file is deprecated and will be removed in a future service pack or release.

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## Platform Notes (Continued)

# Please check /etc/os-release for details about this release.

os-release:

```
NAME="SLES"
VERSION="12-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"
```

uname -a:

```
Linux dl560gen10-1 4.4.132-94.33-default #1 SMP Tue May 29 20:09:56 UTC 2018 (76aae3b)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB
```

run-level 3 Jul 19 13:37

SPEC is set to: /home/cpu2017

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        xfs   331G  134G  197G  41% /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 U34 06/15/2018

Memory:

48x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

## Compiler Version Notes

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

icc (ICC) 18.0.2 20180210

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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## Compiler Version Notes (Continued)

CXXC 508.namd\_r(base) 510.parest\_r(base)

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

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

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.

FC 507.cactuBSSN\_r(base)

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

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

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

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
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## Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

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## Base Compiler Invocation (Continued)

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=3
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

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/HPE-Platform-Flags-Intel-V1.2-SKX-revH.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/HPE-Platform-Flags-Intel-V1.2-SKX-revH.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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