



# SPEC® CPU2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL560 Gen10

(3.00 GHz, Intel Xeon Gold 6136)

SPECrate2017\_fp\_base = 316

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 3

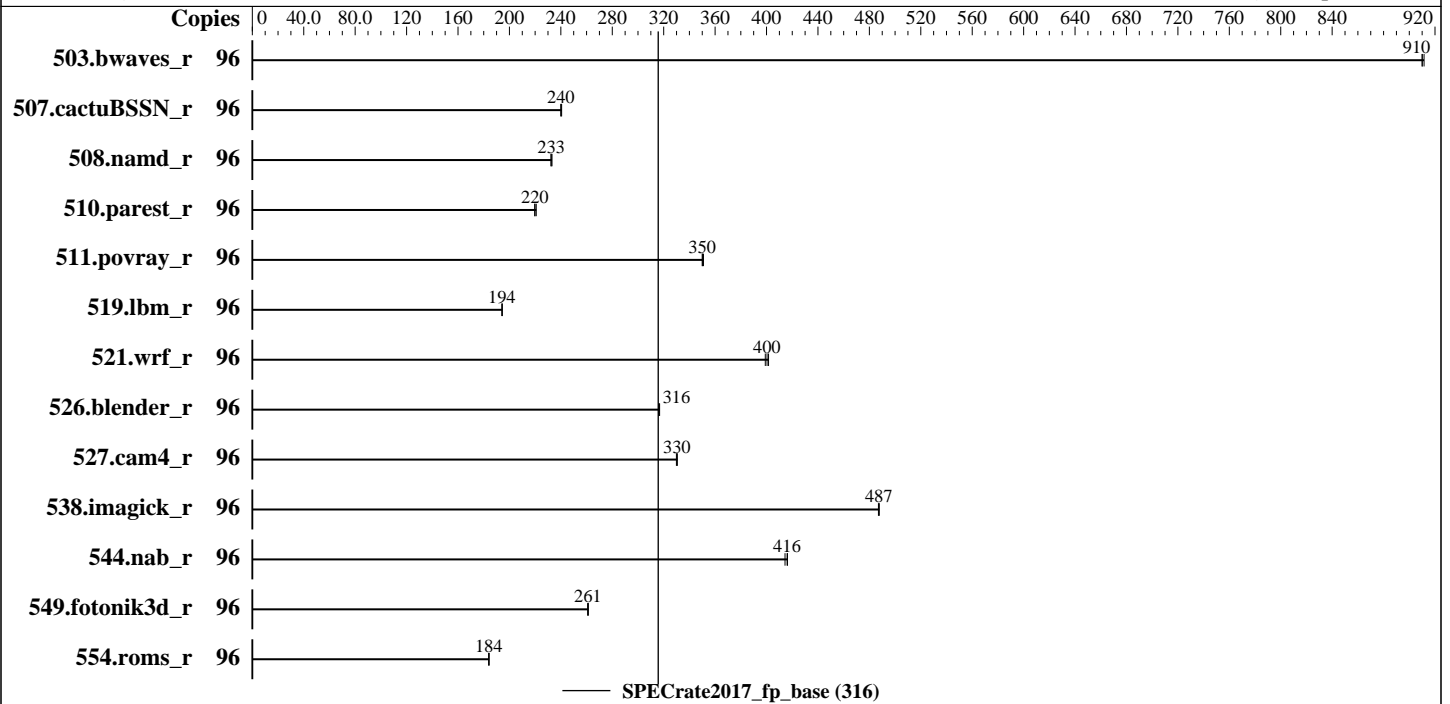
Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2017

Hardware Availability: Oct-2017

Software Availability: Sep-2017



## Hardware

CPU Name: Intel Xeon Gold 6136  
 Max MHz.: 3700  
 Nominal: 3000  
 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: 24.75 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)  
 Storage: 1 x 960 GB SATA SSD, RAID 0  
 Other: None

## Software

OS: SUSE Linux Enterprise Server 12 (x86\_64) SP2  
 Kernel 4.4.21-69-default  
 Compiler: C/C++: Version 18.0.0.128 of Intel C/C++  
 Compiler for Linux;  
 Fortran: Version 18.0.0.128 of Intel Fortran  
 Compiler for Linux  
 Parallel: No  
 Firmware: HPE BIOS Version U34 09/29/2017 released Oct-2017  
 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	1058	910	1056	911	<b>1058</b>	<b>910</b>							
507.cactuBSSN_r	96	506	240	<b>506</b>	<b>240</b>	505	241							
508.namd_r	96	<b>392</b>	<b>233</b>	393	232	391	233							
510.parest_r	96	1137	221	1143	220	<b>1142</b>	<b>220</b>							
511.povray_r	96	639	351	640	350	<b>640</b>	<b>350</b>							
519.lbm_r	96	521	194	521	194	<b>521</b>	<b>194</b>							
521.wrf_r	96	<b>537</b>	<b>400</b>	536	402	539	399							
526.blender_r	96	<b>462</b>	<b>316</b>	461	317	462	316							
527.cam4_r	96	509	330	<b>508</b>	<b>330</b>	508	331							
538.imagick_r	96	<b>490</b>	<b>487</b>	490	487	490	488							
544.nab_r	96	388	416	390	414	<b>388</b>	<b>416</b>							
549.fotonik3d_r	96	1434	261	<b>1432</b>	<b>261</b>	1431	261							
554.roms_r	96	828	184	<b>829</b>	<b>184</b>	830	184							

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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"
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>
irqbalance disabled with "service irqbalance stop"
tuned profile set with "tuned-adm profile throughput-performance"
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"
```

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/SPECCPU2017/lib/ia32:/home/SPECCPU2017/lib/intel64:/home/SPECCPU2017/je5.0.1-32"  
LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/home/SPECCPU2017/je5.0.1-64"

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## General Notes (Continued)

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

No: 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.

No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, <http://www.spec.org/osg/policy.htm>.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

## 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

Stale A to S set to Enabled

Workload Profile set to General Throughput Compute

Minimum Processor Idle Power Core C-State set to C1E State

Sysinfo program /home/SPECCPU2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on linux-smfo Mon Dec 11 20:09:27 2017

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 6136 CPU @ 3.00GHz

4 "physical id"s (chips)

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## Platform Notes (Continued)

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 9 10 16 18 19 25 26
physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 2: cores 0 1 2 3 4 8 9 11 17 18 19 20
physical 3: cores 0 1 2 3 4 8 9 11 17 18 19 20
```

From lscpu:

```
Architecture:          x86_64
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 6136 CPU @ 3.00GHz
Stepping:              4
CPU MHz:               2992.958
BogoMIPS:              5985.91
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              25344K
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:                  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
aperfperf 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
xsaves avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
```

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## Platform Notes (Continued)

erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd  
avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm\_llc cqm\_occup\_llc

```
/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: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 48 49 50 51 52 53
node 0 size: 96348 MB
node 0 free: 91546 MB
node 1 cpus: 6 7 8 9 10 11 54 55 56 57 58 59
node 1 size: 96766 MB
node 1 free: 93758 MB
node 2 cpus: 12 13 14 15 16 17 60 61 62 63 64 65
node 2 size: 96766 MB
node 2 free: 93753 MB
node 3 cpus: 18 19 20 21 22 23 66 67 68 69 70 71
node 3 size: 96766 MB
node 3 free: 93848 MB
node 4 cpus: 24 25 26 27 28 29 72 73 74 75 76 77
node 4 size: 96766 MB
node 4 free: 93850 MB
node 5 cpus: 30 31 32 33 34 35 78 79 80 81 82 83
node 5 size: 96766 MB
node 5 free: 93846 MB
node 6 cpus: 36 37 38 39 40 41 84 85 86 87 88 89
node 6 size: 96766 MB
node 6 free: 93847 MB
node 7 cpus: 42 43 44 45 46 47 90 91 92 93 94 95
node 7 size: 96764 MB
node 7 free: 93848 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: 792278832 kB
HugePages_Total: 0
```

(Continued on next page)



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## Platform Notes (Continued)

Hugepagesize: 2048 kB

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2
```

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

```
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
```

```
os-release:
NAME="SLES"
VERSION="12-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```
uname -a:
Linux linux-smfo 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Dec 11 15:58
```

```
SPEC is set to: /home/SPECCPU2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   852G  169G  684G  20% /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 09/29/2017
Memory:
48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666
```

(End of data from sysinfo program)

## Compiler Version Notes

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

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## Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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

-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
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## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## 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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

-ffinite-math-only -qopt-mem-layout-trans=3

C++ benchmarks:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

(Continued on next page)





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## Base Optimization Flags (Continued)

C++ benchmarks (continued):

-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs

-align array32byte

Benchmarks using both Fortran and C:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs

-align array32byte

Benchmarks using both C and C++:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

-ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs

-align array32byte

## Base Other Flags

C benchmarks:

-m64 -std=c11

C++ benchmarks:

-m64

Fortran benchmarks:

-m64

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using both C and C++:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11



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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html>

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

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revG.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).

Tested with SPEC CPU2017 v1.0.2 on 2017-12-11 21:09:26-0500.

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