



SPEC CPU®2017 Floating Point Rate Result

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Huawei

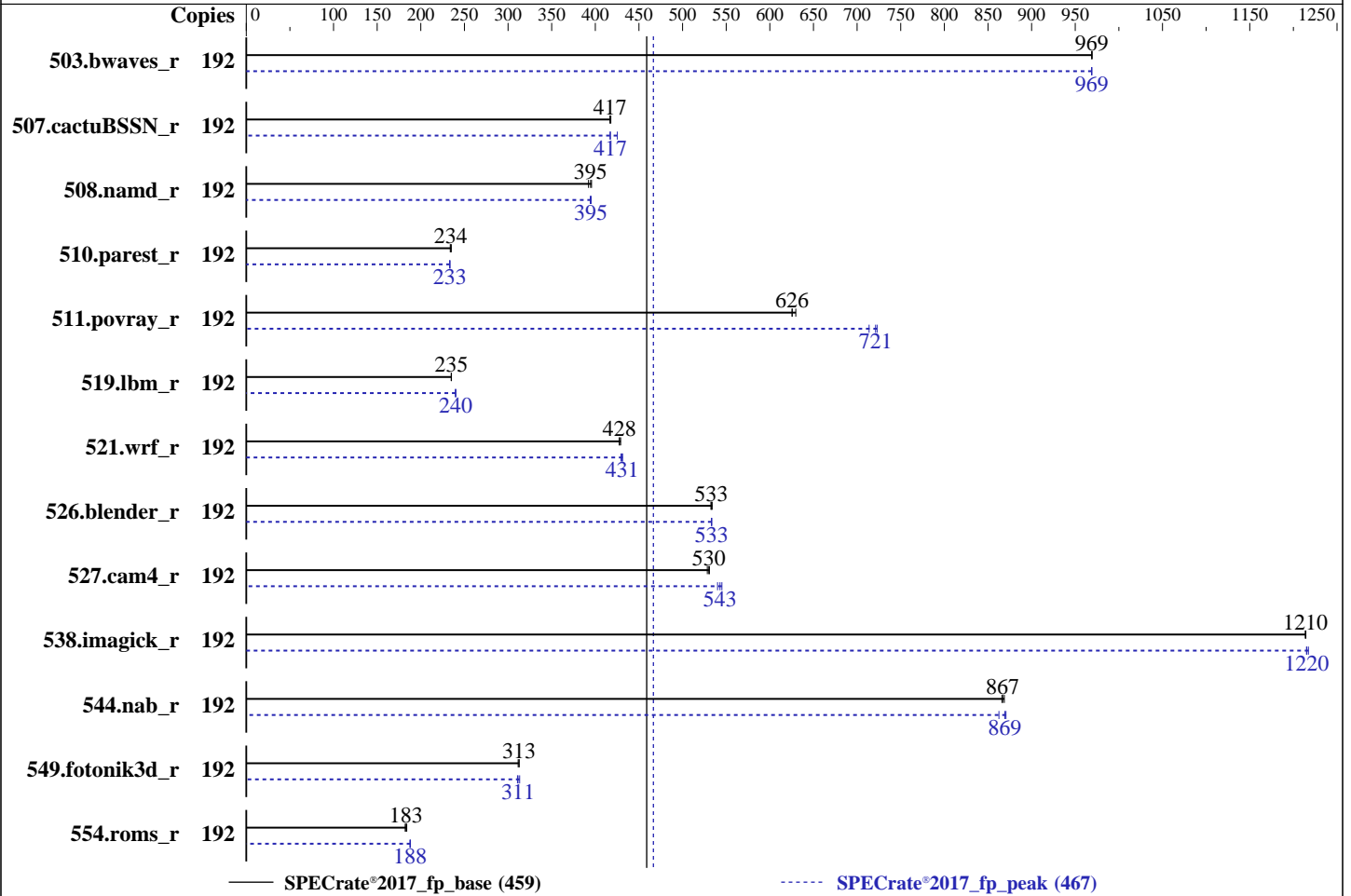
SPECrate®2017_fp_base = 459

Huawei 2488H V5 (Intel Xeon Platinum 8160M)

SPECrate®2017_fp_peak = 467

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: May-2018
Hardware Availability: May-2018
Software Availability: Mar-2018



Hardware

CPU Name: Intel Xeon Platinum 8160M
Max MHz: 3700
Nominal: 2100
Enabled: 96 cores, 4 chips, 2 threads/core
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 33 MB I+D on chip per chip
Other: None
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 900 GB SAS HDD 10K RPM, RAID 0
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP2
4.4.120-92.70-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: Version 8.92 released May-2018
File System: btrfs
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --



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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	192	1987	969	<u>1987</u>	<u>969</u>	1986	969	192	<u>1987</u>	<u>969</u>	1988	969	1987	969
507.cactuBSSN_r	192	583	417	<u>583</u>	<u>417</u>	582	418	192	<u>582</u>	<u>417</u>	583	417	572	425
508.namd_r	192	<u>462</u>	<u>395</u>	461	396	465	392	192	<u>462</u>	<u>395</u>	462	395	463	394
510.parest_r	192	<u>2144</u>	<u>234</u>	2138	235	2149	234	192	2152	233	2156	233	<u>2153</u>	<u>233</u>
511.povray_r	192	712	630	717	625	<u>717</u>	<u>626</u>	192	628	714	<u>622</u>	<u>721</u>	620	723
519.lbm_r	192	862	235	<u>861</u>	<u>235</u>	861	235	192	843	240	844	240	<u>843</u>	<u>240</u>
521.wrf_r	192	1006	427	<u>1005</u>	<u>428</u>	1002	429	192	997	431	<u>999</u>	<u>431</u>	1001	429
526.blender_r	192	<u>548</u>	<u>533</u>	548	534	549	532	192	549	533	<u>548</u>	<u>533</u>	548	533
527.cam4_r	192	<u>634</u>	<u>530</u>	633	531	636	528	192	622	540	616	545	<u>619</u>	<u>543</u>
538.imagick_r	192	393	1210	<u>393</u>	<u>1210</u>	393	1210	192	393	1220	<u>393</u>	<u>1220</u>	392	1220
544.nab_r	192	<u>373</u>	<u>867</u>	373	866	372	869	192	<u>372</u>	<u>869</u>	375	863	371	871
549.fotonik3d_r	192	2393	313	2402	312	<u>2394</u>	<u>313</u>	192	2407	311	2388	313	<u>2402</u>	<u>311</u>
554.roms_r	192	<u>1667</u>	<u>183</u>	1675	182	1659	184	192	<u>1624</u>	<u>188</u>	1621	188	1626	188

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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"
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/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 i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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>

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General Notes (Continued)

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:

Sub NUMA Cluster (SNC) set to enabled
IMC (Integrated memory controller) Interleaving set to 1 way interleave
Xtended Prediction Table (XPT) Prefetch set to Enable
Memory Patrol Scrub set to Disable
Last Level Cache (LLC) Prefetch set to Disable
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-scjg Thu Aug 23 10:19:58 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) Platinum 8160M CPU @ 2.10GHz
 4 "physical id"s (chips)
192 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 192
On-line CPU(s) list: 0-191
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 8
```

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Platform Notes (Continued)

```

Vendor ID:           GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Platinum 8160M CPU @ 2.10GHz
Stepping:           4
CPU MHz:            2101.000
CPU max MHz:        2101.0000
CPU min MHz:        1000.0000
BogoMIPS:           4200.03
Virtualization:     VT-x
L1d cache:          32K
L1i cache:          32K
L2 cache:           1024K
L3 cache:           33792K
NUMA node0 CPU(s): 0-2,6-8,12-14,18-20,96-98,102-104,108-110,114-116
NUMA node1 CPU(s): 3-5,9-11,15-17,21-23,99-101,105-107,111-113,117-119
NUMA node2 CPU(s): 24-26,30-32,36-38,42-44,120-122,126-128,132-134,138-140
NUMA node3 CPU(s): 27-29,33-35,39-41,45-47,123-125,129-131,135-137,141-143
NUMA node4 CPU(s): 48-50,54-56,60-62,66-68,144-146,150-152,156-158,162-164
NUMA node5 CPU(s): 51-53,57-59,63-65,69-71,147-149,153-155,159-161,165-167
NUMA node6 CPU(s): 72-74,78-80,84-86,90-92,168-170,174-176,180-182,186-188
NUMA node7 CPU(s): 75-77,81-83,87-89,93-95,171-173,177-179,183-185,189-191
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
aperfmpperf eagerfpu pni pclmulqdq dtes64 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 ida arat epb invpcid_single pln pts dtherm
intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vmmi 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

```

```
/proc/cpuinfo cache data
cache size : 33792 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 6 7 8 12 13 14 18 19 20 96 97 98 102 103 104 108 109 110 114 115 116
node 0 size: 191788 MB
node 0 free: 191128 MB
node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 99 100 101 105 106 107 111 112 113 117 118
119
node 1 size: 193524 MB
node 1 free: 193205 MB
node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44 120 121 122 126 127 128 132 133 134

```

(Continued on next page)



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Platform Notes (Continued)

```

138 139 140
node 2 size: 193524 MB
node 2 free: 193204 MB
node 3 cpus: 27 28 29 33 34 35 39 40 41 45 46 47 123 124 125 129 130 131 135 136 137
141 142 143
node 3 size: 193524 MB
node 3 free: 193240 MB
node 4 cpus: 48 49 50 54 55 56 60 61 62 66 67 68 144 145 146 150 151 152 156 157 158
162 163 164
node 4 size: 193524 MB
node 4 free: 193294 MB
node 5 cpus: 51 52 53 57 58 59 63 64 65 69 70 71 147 148 149 153 154 155 159 160 161
165 166 167
node 5 size: 193524 MB
node 5 free: 193291 MB
node 6 cpus: 72 73 74 78 79 80 84 85 86 90 91 92 168 169 170 174 175 176 180 181 182
186 187 188
node 6 size: 193524 MB
node 6 free: 193296 MB
node 7 cpus: 75 76 77 81 82 83 87 88 89 93 94 95 171 172 173 177 178 179 183 184 185
189 190 191
node 7 size: 193365 MB
node 7 free: 193154 MB
node distances:
node  0  1  2  3  4  5  6  7
 0:  10  20  20  20  20  20  20  20
 1:  20  10  20  20  20  20  20  20
 2:  20  20  10  20  20  20  20  20
 3:  20  20  20  10  20  20  20  20
 4:  20  20  20  20  10  20  20  20
 5:  20  20  20  20  20  10  20  20
 6:  20  20  20  20  20  20  10  20
 7:  20  20  20  20  20  20  20  10

```

```

From /proc/meminfo
MemTotal:      1583411184 kB
HugePages_Total:      0
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

```

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Platform Notes (Continued)

```
# 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-scjg 4.4.120-92.70-default #1 SMP Wed Mar 14 15:59:43 UTC 2018 (52a83de)
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 5 Aug 23 10:19

```
SPEC is set to: /home/cpu2017
Filesystem      Type      Size      Used Avail Use% Mounted on
/dev/sda4       btrfs    717G      29G   687G   4% /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 INSYDE Corp. 8.92 05/02/2018
Memory:
48x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666
```

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C          | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
          | 544.nab_r(base, peak)
-----
```

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

```
=====
C++       | 508.namd_r(base, peak) 510.parest_r(base, peak)
-----
```

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

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Compiler Version Notes (Continued)

=====
C++, C | 511.povray_r(base, peak) 526.blender_r(base, peak)
=====

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.
=====

=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
=====

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.
=====

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
=====

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

=====
Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
=====

ifort (IFORT) 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.
=====

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

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Base Compiler Invocation (Continued)

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-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

Fortran benchmarks:

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

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

-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

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

Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

(Continued on next page)



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Peak Compiler Invocation (Continued)

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:

(Continued on next page)



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Peak Optimization Flags (Continued)

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

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

526.blender_r: -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

Peak 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

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

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Huawei

SPECrate®2017_fp_base = 459

Huawei 2488H V5 (Intel Xeon Platinum 8160M)

SPECrate®2017_fp_peak = 467

CPU2017 License: 3175

Test Sponsor: Huawei

Tested by: Huawei

Test Date: May-2018

Hardware Availability: May-2018

Software Availability: Mar-2018

Peak Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

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.html>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.7.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.xml>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.7.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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