SPEC® CPU2017 Floating Point Rate Result

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Huawei

Huawei 2488 V5 (Intel Xeon Gold 5120)

SPECrate2017_fp_base = 276

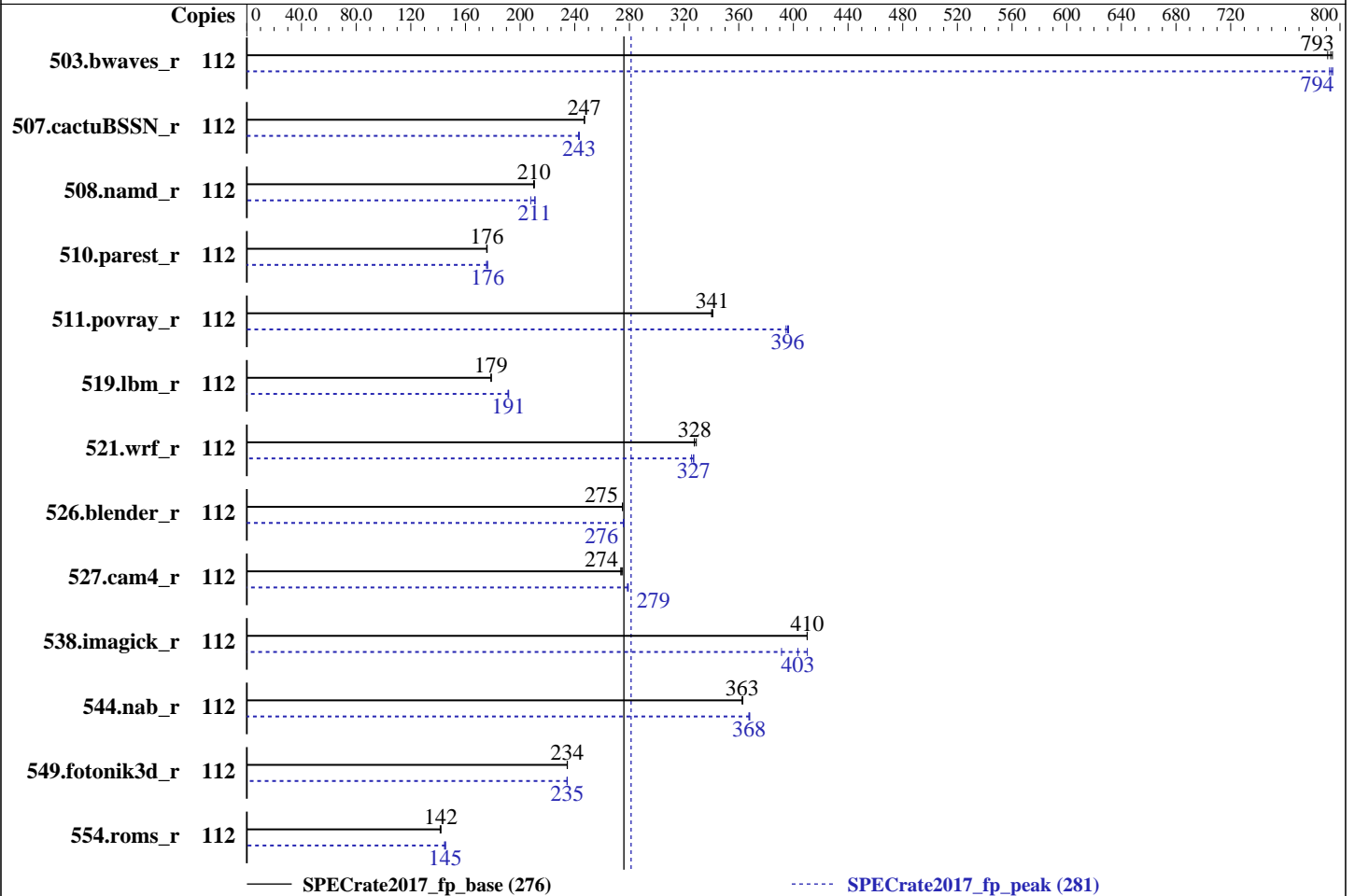SPECrate2017_fp_peak = 281

CPU2017 License: 3175

Test Sponsor: Huawei

Tested by: Huawei

Test Date: May-2018

Hardware Availability: May-2018

Software Availability: Mar-2018

Copies

Benchmark	Copies	base	peak
503.bwaves_r	112	793	794
507.cactuBSSN_r	112	247	243
508.namd_r	112	210	211
510.parest_r	112	176	176
511.povray_r	112	341	396
519.lbm_r	112	179	191
521.wrf_r	112	328	327
526.blender_r	112	275	276
527.cam4_r	112	274	279
538.imagick_r	112	410	403
544.nab_r	112	363	368
549.fotonik3d_r	112	234	235
554.roms_r	112	142	145

————— SPECrate2017_fp_base (276)

- - - - SPECrate2017_fp_peak (281)

Hardware

CPU Name: Intel Xeon Gold 5120

 Max MHz.: 3200

 Nominal: 2200

Enabled: 56 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: 19.25 MB I+D on chip per chip

 Other: None

Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)

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 18.0.0.128 of Intel C/C++
Compiler for Linux;
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux

Parallel: No

Firmware: Version 0.80 released Feb-2018

File System: btrfs

System State: Run level 5 (multi-user)

Base Pointers: 64-bit

Peak Pointers: 64-bit

Other: None

Standard Performance Evaluation Corporation (info@spec.org)

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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	112	1420	791	**1416**	**793**	1414	794	112	1417	792	1413	795	**1415**	**794**
507.cactuBSSN_r	112	574	247	**574**	**247**	574	247	112	584	243	583	243	**583**	**243**
508.namd_r	112	507	210	**507**	**210**	505	210	112	512	208	504	211	**505**	**211**
510.parest_r	112	1666	176	**1668**	**176**	1669	176	112	**1664**	**176**	1663	176	1670	175
511.povray_r	112	**768**	**341**	767	341	769	340	112	663	395	660	396	**661**	**396**
519.lbm_r	112	660	179	**660**	**179**	660	179	112	**617**	**191**	616	192	617	191
521.wrf_r	112	766	327	763	329	**766**	**328**	112	**767**	**327**	771	325	767	327
526.blender_r	112	621	275	620	275	**620**	**275**	112	**619**	**276**	619	276	618	276
527.cam4_r	112	**714**	**274**	716	274	712	275	112	703	279	**703**	**279**	702	279
538.imagick_r	112	679	410	679	410	**679**	**410**	112	**691**	**403**	712	391	679	410
544.nab_r	112	519	363	520	362	**520**	**363**	112	512	368	513	368	**513**	**368**
549.fotonik3d_r	112	**1861**	**234**	1862	234	1860	235	112	1863	234	1861	235	**1861**	**235**
554.roms_r	112	1258	142	**1254**	**142**	1254	142	112	1230	145	1223	145	**1226**	**145**

SPECrate2017_fp_base =	**276**
SPECrate2017_fp_peak =	**281**

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>

(Continued on next page)

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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/speccpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on guyuxin Sat Jul 28 20:39:11 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 5120 CPU @ 2.20GHz
       4  "physical id"s (chips)
       112 "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 : 14
       siblings  : 28
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
       physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

 From lscpu:
       Architecture:          x86_64
       CPU op-mode(s):        32-bit, 64-bit
       Byte Order:            Little Endian
       CPU(s):                112
       On-line CPU(s) list:   0-111
       Thread(s) per core:    2
       Core(s) per socket:    14
       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 5120 CPU @ 2.20GHz
          Stepping:                4
          CPU MHz:                 1000.000
          CPU max MHz:             2201.0000
          CPU min MHz:             1000.0000
          BogoMIPS:                4400.09
          Virtualization:          VT-x
          L1d cache:               32K
          L1i cache:               32K
          L2 cache:                1024K
          L3 cache:                19712K
          NUMA node0 CPU(s):       0-3,7-9,56-59,63-65
          NUMA node1 CPU(s):       4-6,10-13,60-62,66-69
          NUMA node2 CPU(s):       14-17,21-23,70-73,77-79
          NUMA node3 CPU(s):       18-20,24-27,74-76,80-83
          NUMA node4 CPU(s):       28-31,35-37,84-87,91-93
          NUMA node5 CPU(s):       32-34,38-41,88-90,94-97
          NUMA node6 CPU(s):       42-45,49-51,98-101,105-107
          NUMA node7 CPU(s):       46-48,52-55,102-104,108-111
          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
     aperfmperf 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
     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

  /proc/cpuinfo cache data
     cache size : 19712 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 7 8 9 56 57 58 59 63 64 65
     node 0 size: 94798 MB
     node 0 free: 87168 MB
     node 1 cpus: 4 5 6 10 11 12 13 60 61 62 66 67 68 69
     node 1 size: 96756 MB
     node 1 free: 90282 MB
     node 2 cpus: 14 15 16 17 21 22 23 70 71 72 73 77 78 79
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 2 size: 96756 MB
   node 2 free: 90861 MB
   node 3 cpus: 18 19 20 24 25 26 27 74 75 76 80 81 82 83
   node 3 size: 96756 MB
   node 3 free: 90860 MB
   node 4 cpus: 28 29 30 31 35 36 37 84 85 86 87 91 92 93
   node 4 size: 96756 MB
   node 4 free: 90823 MB
   node 5 cpus: 32 33 34 38 39 40 41 88 89 90 94 95 96 97
   node 5 size: 96756 MB
   node 5 free: 90919 MB
   node 6 cpus: 42 43 44 45 49 50 51 98 99 100 101 105 106 107
   node 6 size: 96756 MB
   node 6 free: 90684 MB
   node 7 cpus: 46 47 48 52 53 54 55 102 103 104 108 109 110 111
   node 7 size: 96598 MB
   node 7 free: 90669 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:       790460632 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
       # 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"
```

(Continued on next page)

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Platform Notes (Continued)

```
       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 guyuxin 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 Jul 28 09:41

 SPEC is set to: /home/speccpu2017
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda4       btrfs  697G  121G  576G  18% /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. 0.80 02/24/2018
   Memory:
    24x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400
    8x NO DIMM NO DIMM

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
  CC   519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
  CC   519.lbm_r(peak) 544.nab_r(peak)
------------------------------------------------------------------------------
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
```

(Continued on next page)

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
CXXC 508.namd_r(peak) 510.parest_r(peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------


==============================================================================
CC   511.povray_r(peak) 526.blender_r(peak)
------------------------------------------------------------------------------
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   507.cactuBSSN_r(peak)
------------------------------------------------------------------------------
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
```

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==============================================================================
 FC  503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==============================================================================
FC    554.roms_r(peak)
------------------------------------------------------------------------------
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
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==============================================================================
CC    521.wrf_r(peak) 527.cam4_r(peak)
------------------------------------------------------------------------------
ifort (IFORT) 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.
--------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```

(Continued on next page)

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Base Compiler Invocation (Continued)

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
-qopt-mem-layout-trans=3 -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=3 -nostandard-realloc-lhs -align array32byte
```

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Base Optimization Flags (Continued)

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 -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
```

Peak Compiler Invocation

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```

(Continued on next page)

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Peak Compiler Invocation (Continued)

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 519.lbm_r`

C++ benchmarks:
`-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`

Fortran benchmarks:

503.bwaves_r: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

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 -nostandard-realloc-lhs`

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SPECrate2017_fp_base = 276

Huawei 2488 V5 (Intel Xeon Gold 5120)

SPECrate2017_fp_peak = 281

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

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

Peak Optimization Flags (Continued)

554.roms_r (continued):
```
-align array32byte
```

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 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C 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
```

Benchmarks using Fortran, C, 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 -nostandard-realloc-lhs -align array32byte
```

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
```

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

SPEC CPU2017 Floating Point Rate Result

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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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