SPEC® CPU2017 Floating Point Rate Result

Huawei

Huawei 5288 V5 (Intel Xeon Gold 5115)

SPECrate2017_fp_base = 111

SPECrate2017_fp_peak = 114
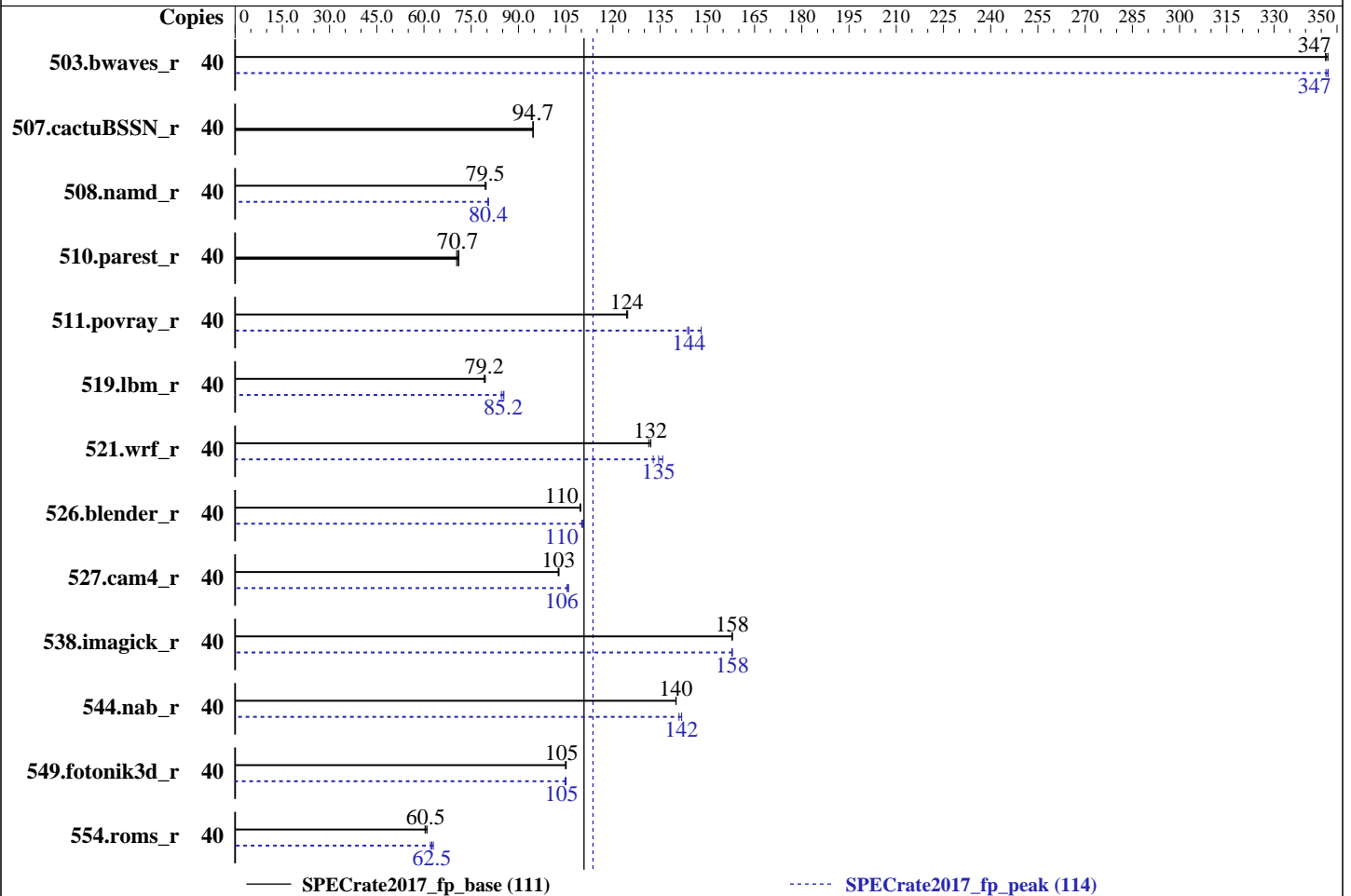
CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: Aug-2018
Hardware Availability: Jul-2017
Software Availability: Jan-2018

Copies		
503.bwaves_r	40	347 / 347
507.cactuBSSN_r	40	94.7
508.namd_r	40	79.5 / 80.4
510.parest_r	40	70.7
511.povray_r	40	124 / 144
519.lbm_r	40	79.2 / 85.2
521.wrf_r	40	132 / 135
526.blender_r	40	110 / 110
527.cam4_r	40	103 / 106
538.imagick_r	40	158 / 158
544.nab_r	40	140 / 142
549.fotonik3d_r	40	105 / 105
554.roms_r	40	60.5 / 62.5

—— SPECrate2017_fp_base (111)   ---- SPECrate2017_fp_peak (114)

Hardware

CPU Name: Intel Xeon Gold 5115
 Max MHz.: 3200
 Nominal: 2400
Enabled: 20 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 13.75 MB I+D on chip per chip
 Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
 3.10.0-693.11.6.el7.x86_64
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 0.62 Released Mar-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

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Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	40	1158	346	**1157**	**347**	1156	347	40	**1156**	**347**	1155	347	1158	346
507.cactuBSSN_r	40	**535**	**94.7**	535	94.6	535	94.7	40	**535**	**94.7**	535	94.6	535	94.7
508.namd_r	40	**478**	**79.5**	478	79.5	476	79.7	40	473	80.3	**473**	**80.4**	472	80.5
510.parest_r	40	**1480**	**70.7**	1472	71.1	1487	70.4	40	**1480**	**70.7**	1472	71.1	1487	70.4
511.povray_r	40	**750**	**124**	751	124	749	125	40	**648**	**144**	631	148	650	144
519.lbm_r	40	532	79.2	**532**	**79.2**	530	79.5	40	**495**	**85.2**	494	85.4	498	84.6
521.wrf_r	40	682	131	**679**	**132**	678	132	40	**666**	**135**	675	133	660	136
526.blender_r	40	**555**	**110**	555	110	556	110	40	551	110	553	110	**552**	**110**
527.cam4_r	40	682	103	**681**	**103**	680	103	40	**661**	**106**	663	105	661	106
538.imagick_r	40	630	158	**630**	**158**	630	158	40	**630**	**158**	630	158	630	158
544.nab_r	40	**481**	**140**	481	140	481	140	40	**475**	**142**	475	142	477	141
549.fotonik3d_r	40	1482	105	**1483**	**105**	1486	105	40	**1483**	**105**	1483	105	1487	105
554.roms_r	40	1043	61.0	**1050**	**60.5**	1053	60.3	40	1024	62.1	1009	63.0	**1017**	**62.5**

SPECrate2017_fp_base = 111

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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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/spec2017/lib/ia32:/spec2017/lib/intel64:/spec2017/je5.0.1-32:/spec2017/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>
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.

(Continued on next page)

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General Notes (Continued)

```
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:
Power Policy Set to Performance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on localhost.localdomain Fri Aug 10 18:46:45 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 5115 CPU @ 2.40GHz
      2  "physical id"s (chips)
      40 "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 : 10
      siblings  : 20
      physical 0: cores 0 1 2 3 4 8 9 10 11 12
      physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
     CPU(s):              40
     On-line CPU(s) list: 0-39
     Thread(s) per core:  2
     Core(s) per socket:  10
     Socket(s):           2
     NUMA node(s):        2
     Vendor ID:           GenuineIntel
     CPU family:          6
     Model:               85
     Model name:          Intel(R) Xeon(R) Gold 5115 CPU @ 2.40GHz
     Stepping:            4
     CPU MHz:             2400.000
     BogoMIPS:            4800.00
```

(Continued on next page)

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Platform Notes (Continued)

```
        Virtualization:        VT-x
        L1d cache:             32K
        L1i cache:             32K
        L2 cache:              1024K
        L3 cache:              14080K
        NUMA node0 CPU(s):     0-9,20-29
        NUMA node1 CPU(s):     10-19,30-39
        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 ds_cpl vmx smx est tm2 ssse3 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 epb cat_l3 cdp_l3 invpcid_single intel_pt
        spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
        bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
        smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc
        cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

  /proc/cpuinfo cache data
     cache size : 14080 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
     available: 2 nodes (0-1)
     node 0 cpus: 0 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29
     node 0 size: 195701 MB
     node 0 free: 190057 MB
     node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
     node 1 size: 196608 MB
     node 1 free: 191171 MB
     node distances:
     node   0   1
       0:  10  21
       1:  21  10

  From /proc/meminfo
     MemTotal:       395141240 kB
     HugePages_Total:        0
     Hugepagesize:        2048 kB

  From /etc/*release* /etc/*version*
     os-release:
        NAME="Red Hat Enterprise Linux Server"
        VERSION="7.4 (Maipo)"
        ID="rhel"
        ID_LIKE="fedora"
        VARIANT="Server"
```

(Continued on next page)

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Platform Notes (Continued)

```
        VARIANT_ID="server"
        VERSION_ID="7.4"
        PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
    redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

 uname -a:
    Linux localhost.localdomain 3.10.0-693.11.6.el7.x86_64 #1 SMP Thu Dec 28 14:23:39 EST
    2017 x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 Aug 10 08:24

 SPEC is set to: /spec2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   700G   35G  666G   5% /

 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. 0.62 03/26/2018
   Memory:
    24x Samsung M393A2K43BB1-CTD 16 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, 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)
------------------------------------------------------------------------------
```

(Continued on next page)

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Compiler Version Notes (Continued)

```
icpc (ICC) 18.0.0 20170811
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.
```

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CPU2017 License: 3175　　　　　　　　　　　　　　　　**Test Date:** Aug-2018
Test Sponsor: Huawei　　　　　　　　　　　　　　　**Hardware Availability:** Jul-2017
Tested by: Huawei　　　　　　　　　　　　　　　　**Software Availability:** Jan-2018

Compiler Version Notes (Continued)

```
ifort (IFORT) 18.0.0 20170811
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`

(Continued on next page)

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Base Optimization Flags (Continued)

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
```

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
```

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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:

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: `basepeak = yes`

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`

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Peak Optimization Flags (Continued)

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`
`-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++:

507.cactuBSSN_r: basepeak = yes

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`

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CPU2017 License: 3175		**Test Date:**	Aug-2018
Test Sponsor: Huawei		**Hardware Availability:**	Jul-2017
Tested by: Huawei		**Software Availability:**	Jan-2018

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-V1.9-revC.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-V1.9-revC.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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