SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen10
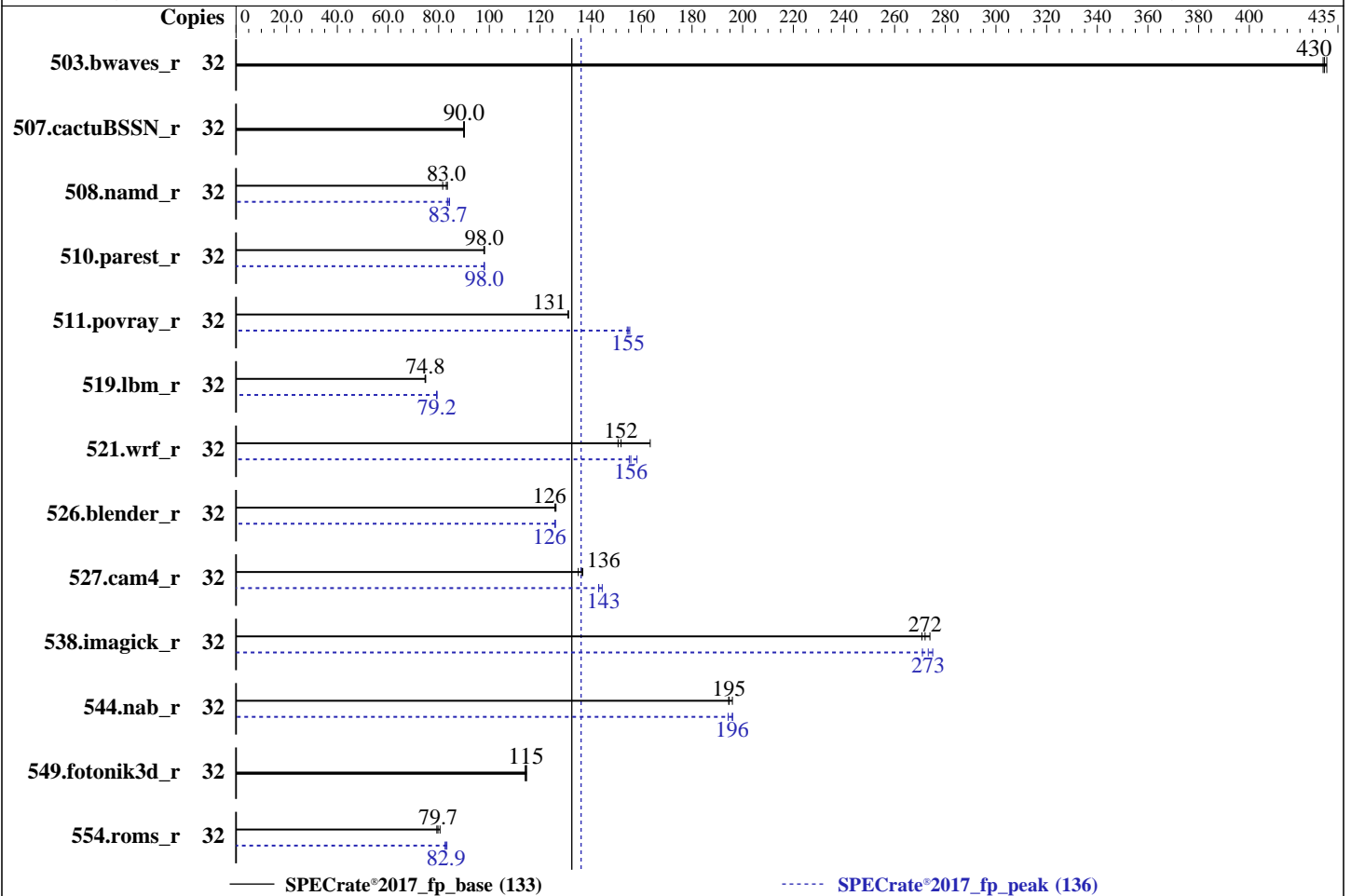(3.20 GHz, Intel Xeon Gold 6134)

$SPECrate®2017\_fp\_base = 133$

$SPECrate®2017\_fp\_peak = 136$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2018

Hardware Availability: Oct-2018

Software Availability: Nov-2018

Benchmark	Copies	base	peak
503.bwaves_r	32	430	
507.cactuBSSN_r	32	90.0	
508.namd_r	32	83.0	83.7
510.parest_r	32	98.0	98.0
511.povray_r	32	131	155
519.lbm_r	32	74.8	79.2
521.wrf_r	32	152	156
526.blender_r	32	126	126
527.cam4_r	32	136	143
538.imagick_r	32	272	273
544.nab_r	32	195	196
549.fotonik3d_r	32	115	
554.roms_r	32	79.7	82.9

SPECrate®2017_fp_base (133) ----- SPECrate®2017_fp_peak (136)

Hardware

CPU Name: Intel Xeon Gold 6134
 Max MHz: 3700
 Nominal: 3200
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 1, 2 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: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 2 x 300 GB 10 K SAS, RAID 1
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3
 Kernel 4.4.162-94.72-default
Compiler: C/C++: Version 19.0.0.117 of Intel
 C/C++ Compiler for Linux;
 Fortran: Version 19.0.0.117 of
 Intel Fortran Compiler for Linux
Parallel: No
Firmware: HPE BIOS Version U30 10/02/2018 released Oct-2018
File System: btrfs
System State: Run level 5 (multi-user, w/GUI)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --

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ProLiant DL380 Gen10
(3.20 GHz, Intel Xeon Gold 6134)

SPECrate®2017_fp_base = 133

SPECrate®2017_fp_peak = 136

CPU2017 License: 3	**Test Date:** Dec-2018
Test Sponsor: HPE	**Hardware Availability:** Oct-2018
Tested by: HPE	**Software Availability:** Nov-2018

Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	32	**747**	**430**	745	431	748	429	32	**747**	**430**	745	431	748	429
507.cactuBSSN_r	32	449	90.2	451	89.9	**450**	**90.0**	32	449	90.2	451	89.9	**450**	**90.0**
508.namd_r	32	364	83.4	**366**	**83.0**	373	81.6	32	364	83.4	**363**	**83.7**	361	84.3
510.parest_r	32	856	97.8	**854**	**98.0**	854	98.1	32	**855**	**98.0**	854	98.0	855	98.0
511.povray_r	32	570	131	**570**	**131**	569	131	32	**483**	**155**	481	155	484	154
519.lbm_r	32	451	74.9	**451**	**74.8**	452	74.6	32	425	79.3	426	79.2	**426**	**79.2**
521.wrf_r	32	475	151	**472**	**152**	438	164	32	462	155	**460**	**156**	453	158
526.blender_r	32	**387**	**126**	387	126	386	126	32	387	126	**387**	**126**	387	126
527.cam4_r	32	414	135	**410**	**136**	409	137	32	**391**	**143**	391	143	387	145
538.imagick_r	32	294	271	**293**	**272**	291	274	32	**291**	**273**	294	271	289	275
544.nab_r	32	**277**	**195**	277	194	275	196	32	277	194	275	196	**275**	**196**
549.fotonik3d_r	32	1087	115	**1089**	**115**	1092	114	32	1087	115	**1089**	**115**	1092	114
554.roms_r	32	631	80.5	**638**	**79.7**	641	79.3	32	616	82.5	611	83.2	**613**	**82.9**
SPECrate®2017_fp_base =	**133**											
SPECrate®2017_fp_peak =	**136**											

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>

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/cpu2017/lib/ia32:/cpu2017/lib/intel64:/cpu2017/je5.0.1-32:/cpu2017/je5.0.1-64"

 Binaries compiled on a system with 1x Intel Core i9-7900X 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)

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(3.20 GHz, Intel Xeon Gold 6134)

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

Test Date: Dec-2018
Hardware Availability: Oct-2018
Software Availability: Nov-2018

General Notes (Continued)

```
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:
  Memory Patrol Scrubbing set to Disabled
  LLC Dead Line Allocation set to Disabled
  Thermal Configuration set to Maximum Cooling
  LLC Prefetch set to Enabled
  Workload Profile set to General Throughput Compute
    Minimum Processor Idle Power Core C-State set to C1E

 Sysinfo program /cpu2017/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-daj0 Thu Dec 20 23:34:59 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 6134 CPU @ 3.20GHz
       2  "physical id"s (chips)
       32 "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 : 8
       siblings  : 16
       physical 0: cores 0 2 3 9 16 19 26 27
       physical 1: cores 0 2 3 9 16 19 26 27

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                32
      On-line CPU(s) list:   0-31
      Thread(s) per core:    2
      Core(s) per socket:    8
      Socket(s):             2
      NUMA node(s):          4
      Vendor ID:             GenuineIntel
```

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

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Tested by: HPE

Test Date: Dec-2018

Hardware Availability: Oct-2018

Software Availability: Nov-2018

Platform Notes (Continued)

```
          CPU family:           6
          Model:                85
          Model name:           Intel(R) Xeon(R) Gold 6134 CPU @ 3.20GHz
          Stepping:             4
          CPU MHz:              3192.526
          BogoMIPS:             6385.05
          Virtualization:       VT-x
          L1d cache:            32K
          L1i cache:            32K
          L2 cache:             1024K
          L3 cache:             25344K
          NUMA node0 CPU(s):    0-3,16-19
          NUMA node1 CPU(s):    4-7,20-23
          NUMA node2 CPU(s):    8-11,24-27
          NUMA node3 CPU(s):    12-15,28-31
          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 ibrs flush_l1d 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 ssbd ibpb stibp 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 : 25344 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0 1 2 3 16 17 18 19
   node 0 size: 96263 MB
   node 0 free: 88400 MB
   node 1 cpus: 4 5 6 7 20 21 22 23
   node 1 size: 96766 MB
   node 1 free: 89519 MB
   node 2 cpus: 8 9 10 11 24 25 26 27
   node 2 size: 96766 MB
   node 2 free: 90522 MB
   node 3 cpus: 12 13 14 15 28 29 30 31
   node 3 size: 96624 MB
   node 3 free: 92674 MB
   node distances:
   node   0   1   2   3
     0:  10  21  31  31
```

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SPECrate®2017_fp_base = 133

(Test Sponsor: HPE)

ProLiant DL380 Gen10

SPECrate®2017_fp_peak = 136

(3.20 GHz, Intel Xeon Gold 6134)

CPU2017 License: 3 **Test Date:** Dec-2018
Test Sponsor: HPE **Hardware Availability:** Oct-2018
Tested by: HPE **Software Availability:** Nov-2018

Platform Notes (Continued)

```
      1:  21  10  31  31
      2:  31  31  10  21
      3:  31  31  21  10

 From /proc/meminfo
    MemTotal:       395694608 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.
       # 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 linux-daj0 4.4.162-94.72-default #1 SMP Mon Nov 12 18:57:45 UTC 2018 (9de753f)
    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, IBPB, IBRS_FW, STIBP, RSB
 filling

 run-level 5 Dec 20 13:41

 SPEC is set to: /cpu2017
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda3       btrfs  278G   29G  248G  11% /

 Additional information from dmidecode follows.  WARNING: Use caution when you interpret
 this section. The 'dmidecode' program reads system data which is "intended to allow
```

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Platform Notes (Continued)

```
  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 U30 10/02/2018
    Memory:
     12x HPE 840758-091 32 GB 2 rank 2666
     12x UNKNOWN NOT AVAILABLE

  (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)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++              | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C           | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
```

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Compiler Version Notes (Continued)

```
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
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)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

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`

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

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Peak Compiler Invocation

C benchmarks:
```
icc -m64 -std=c11
```

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
```

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`

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Peak Optimization Flags (Continued)

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

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

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
-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 -auto -nostandard-realloc-lhs
-align array32byte

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++:

507.cactuBSSN_r: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.0-official-linux64.2019-01-15.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-ic19.0-official-linux64.2019-01-15.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.xml

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$$SPECrate®2017\_fp\_peak = 136$$

CPU2017 License:	3	**Test Date:**	Dec-2018
Test Sponsor:	HPE	**Hardware Availability:**	Oct-2018
Tested by:	HPE	**Software Availability:**	Nov-2018

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

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