SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.60 GHz, Intel Xeon Platinum 8358P)

SPECspeed®2017_fp_base = 219
SPECspeed®2017_fp_peak = 222

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

Test Date: Jul-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Threads

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Threads</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>266</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>145</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>216</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>167</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>87.2</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>209</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>425</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>114</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>115</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>280</td>
</tr>
</tbody>
</table>

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**SPECspeed®2017_fp_base (219)**

**SPECspeed®2017_fp_peak (222)**

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8358P
- **Max MHz:** 3400
- **Nominal:** 2600
- **Enabled:** 64 cores, 2 chips
- **Orderable:** 1, 2 chip(s)
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 1.25 MB I+D on chip per core
- **L3:** 48 MB I+D on chip per chip
- **Memory:** 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 1 x 800 GB SAS SSD, RAID 0
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)
  - Kernel 4.18.0-240.el8.x86_64
- **Compiler:**
  - C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Compiler Build 20201113 for Linux;
  - Fortran: Version 2021.1 of Intel Fortran Compiler
  - Classic Build 20201112 for Linux;
  - C/C++: Version 2021.1 of Intel C/C++ Compiler
   - Classic Build 20201112 for Linux
- **Parallel:** Yes
- **Firmware:** HPE BIOS Version U46 v1.42 05/26/2021 released
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
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<td>36.1</td>
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<td>61.0</td>
<td>217</td>
<td>61.3</td>
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<td>167</td>
<td>53.1</td>
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<td>53.1</td>
<td>167</td>
</tr>
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<td>628.pop2_s</td>
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<td>88.2</td>
<td>139</td>
<td>85.2</td>
<td>136</td>
<td>87.2</td>
<td>136</td>
<td>87.2</td>
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<td>638.imagick_s</td>
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<td>68.9</td>
<td>209</td>
<td>68.8</td>
<td>210</td>
<td>68.9</td>
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<tr>
<td>644.nab_s</td>
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<td>41.2</td>
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<td>41.1</td>
<td>425</td>
<td>40.9</td>
<td>427</td>
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<td>480</td>
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<td>649.fotonik3d_s</td>
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<td>79.3</td>
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<td>64</td>
<td>56.4</td>
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<td>56.1</td>
<td>281</td>
<td>56.4</td>
<td>279</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 219
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
NA: 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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
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General Notes (Continued)
Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jul 5 08:12:15 EDT 2021
Submission: cpu2017-20210705-27776.sub

Platform Notes
The system ROM used for this result contains Intel microcode version 0xd0002a0 for
the Intel Xeon Platinum 8358P processor
BIOS Configuration:
Workload Profile set to General Peak Frequency Compute
Intel Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Advanced Memory Protection set to Advanced ECC
Last Level Cache (LLC) Prefetch set to Enabled
Last Level Cache (LLC) Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to Custom
   Energy/Performance Bias set to Balanced Power
   DCU Stream Prefetcher set to Disabled
   Adjacent Sector Prefetch set to Disabled
   Minimum Processor Idle Power Package C-State set to No Package State
   Numa Group Size Optimization set to Flat
 SYSinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca646d
 running on localhost.localdomain Thu Jul 1 05:00:25 2021

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 8358P CPU @ 2.60GHz
  2 "physical id"s (chips)
  64 "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 : 32
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  25 26 27 28 29 30 31

(Continued on next page)
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Platform Notes (Continued)

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8358P CPU @ 2.60GHz
Stepping: 6
CPU MHz: 800.983
BogoMIPS: 5200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_1 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512ifma avx512dq rdseed adx smap avx512sfma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512v1 xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occu_pll cqm_mbb_total cqm_mbb_local split_lock_detect wboinvd dtherm ida arat pln pts avx512vbm1 umip pku ospe avx512_vbmi2 gfini vaes vpc favoured xsaveq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

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 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

(Continued on next page)
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spec

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<td>Hardware Availability: Jun-2021</td>
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</tr>
</tbody>
</table>

Platform Notes (Continued)

node 0 size: 974284 MB
node 0 free: 1024820 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 1 size: 969163 MB
node 1 free: 1031118 MB
node distances:
node 0 size: 974284 MB
node 0 free: 1024820 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 1 size: 969163 MB
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node distances:
node 0 size: 974284 MB
node 0 free: 1024820 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 1 size: 969163 MB
node 1 free: 1031118 MB
node distances:

From /proc/meminfo
MemTotal: 2113488848 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance

From /etc/*release* /etc/*version*
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs

(Continued on next page)
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Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2):
barriers and __user pointer sanitation
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 1 01:00
SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 670G 107G 563G 16% /home

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL360 Gen10 Plus
Product Family: ProLiant
Serial: CN7013030H

Additional information from dmidecode 3.2 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.
Memory:
32x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

BIOS:
BIOS Vendor: HPE
BIOS Version: U46
BIOS Date: 05/26/2021
BIOS Revision: 1.42
Firmware Revision: 2.42

(End of data from sysinfo program)

Compiler Version Notes
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base)
==============================================================================
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

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### Compiler Version Notes (Continued)

| C | 644.nab_s(peak) |
|----------------------------------|
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
|-----------------------------------|
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

| C | 644.nab_s(peak) |
|----------------------------------|
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
|----------------------------------|
| Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

| Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |
|----------------------------------|
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

(Continued on next page)
COMPILER VERSION NOTES (CONTINUED)

Fortran, C                   621.wrf_s(base, peak) 627.cam4_s(base, peak)
                              628.pop2_s(base, peak)

---------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R)
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

BASE COMPILER INVOCATION

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

BASE PORTABILITY FLAGS

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
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Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-1jemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -1jemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -1jemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc
644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort
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Test Sponsor: HPE
Tested by: HPE

Test Date: Jul-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -fiopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
-O3 -no-rec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:
621.wrf_s: basepeak = yes
627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: basepeak = yes
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.60 GHz, Intel Xeon Platinum 8358P)

SPECspeed®2017_fp_base = 219
SPECspeed®2017_fp_peak = 222

CPU2017 License: 3
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The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revE.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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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