Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10 Plus
(3.60 GHz, Intel Xeon Gold 6334)

SPECrater®2017_fp_base = 186
SPECrater®2017_fp_peak = 190

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

0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 630 660 690 720 750 780 810 840 870 900 930

503.bwaves_r 32
507.cactuBSSN_r 32
508.namd_r 32
510.parest_r 32
511.povray_r 32
519.lbm_r 32
521.wrf_r 32
526.blender_r 32
527.cam4_r 32
538.imagick_r 32
544.nab_r 32
549.fotonik3d_r 32
554.roms_r 32

Copies

530
30.0
60.0
90.0
120
150
180
210
240
270
300
330
360
390
420
450
480
510
540
570
600
630
660
690
720
750
780
810
840
870
900
930

Hardware
CPU Name: Intel Xeon Gold 6334
Max MHz: 3700
Nominal: 3600
Enabled: 16 cores, 2 chips, 2 threads/core
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: 18 MB I+D on chip per chip
Other: None
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: No
Firmware: HPE BIOS Version U46 v1.42 05/16/2021 released May-2021
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

(Continued on next page)
SPECCPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10 Plus
(3.60 GHz, Intel Xeon Gold 6334)

SPECrate®2017_fp_base = 186
SPECrate®2017_fp_peak = 190

Results Table

<table>
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<tr>
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<td>98.8</td>
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<td>255</td>
<td>99.6</td>
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</tbody>
</table>

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

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
    "/home/cpu2017_1.1.8/lib/intel64:/home/cpu2017_1.1.8/je5.0.1-64"
MALLOC_CONF = "retain:true"
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SPEC CPU®2017 Floating Point Rate Result
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SPECrate®2017_fp_base = 186
SPECrate®2017_fp_peak = 190

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

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

General Notes
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Red Hat Enterprise Linux 8.1
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Aug 2 07:54:41 EDT 2021
Submission: cpu2017-20210802-28515.sub

Platform Notes
The system ROM used for this result contains Intel microcode version 0xd0002a0 for
the Intel Xeon Gold 6334 processor.
BIOS Configuration:
Workload Profile set to General Throughput Compute
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
Enhanced Processor Performance Profile set to Aggressive
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
DCU Stream Prefetcher set to Disabled
XPT Remote Prefetcher set to Enabled
Energy/Performance Bias set to Balanced Performance

Sysinfo program /home/cpu2017_1.1.8/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c64d
running on localhost.localdomain Fri Jun 22 16:44:55 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 6334 CPU @ 3.60GHz

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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Test Sponsor: HPE
Tested by: HPE

SPECrade®2017_fp_base = 186
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Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Platform Notes (Continued)

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 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

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): 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
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
Stepping: 6
CPU MHz: 3103.129
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 18432K
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 constant_tsc art 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
  xtrn 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_l3 invpcid_single ssbd
  mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmbi flexpriority ept vpid ept_ad
  fsqaebase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512ifma avx512ifma
  rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw
  avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total
  cqm_mbb_local split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vbmi umip pk
  ospke avx512_vbmi2 gfnv vaes vpclmulqdq avx512_vnni avx512_bitalg tme

(Continued on next page)
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Platform Notes (Continued)

avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
 cache size : 18432 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: 512081 MB
 node 0 free: 515416 MB
 node 1 cpus: 4 5 6 7 20 21 22 23
 node 1 size: 512439 MB
 node 1 free: 515558 MB
 node 2 cpus: 8 9 10 11 24 25 26 27
 node 2 size: 512573 MB
 node 2 free: 515788 MB
 node 3 cpus: 12 13 14 15 28 29 30 31
 node 3 size: 512418 MB
 node 3 free: 515752 MB
 node distances:
 node   0   1   2   3
0:  10  20  30  30
1:  20  10  30  30
2:  30  30  10  20
3:  30  30  20  10

From /proc/meminfo
 MemTotal:       2113494596 kB
 HugePages_Total:       0
 Hugepagesize:       2048 kB

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

From /etc/*release* /etc/*version*
 os-release:
 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)

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

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<table>
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<th>CPU2017 License: 3</th>
<th>Test Date: Jun-2021</th>
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<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Jun-2021</td>
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<td>Tested by: HPE</td>
<td>Software Availability: Dec-2020</td>
</tr>
</tbody>
</table>

**SPECrate®2017_fp_peak = 190**
**SPECrate®2017_fp_base = 186**

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**Platform Notes (Continued)**

```text
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
```

```text
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 barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): 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

```text
run-level 3 Jun 22 16:41
```

```text
SPEC is set to: /home/cpu2017_1.1.8
```

- `/dev/mapper/rhel-home xfs 670G 238G 433G 36% /home`

From `/sys/devices/virtual/dmi/id`

- Vendor: HPE
- Product: ProLiant DL380 Gen10 Plus
- Product Family: ProLiant
- Serial: CN70490X8B

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: 05/16/2021
- BIOS Revision: 1.42

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Platform Notes (Continued)

Firmware Revision: 2.50

(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) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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==============================================================================
C++, C          | 511.povray_r(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.
==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
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Compiler Version Notes (Continued)

C++, C          | 511.povray_r(peak)

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

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

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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                  | 554.roms_r(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.

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

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Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx 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.ibm_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
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Base Optimization Flags

C benchmarks:
- \(-w\) -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
- \(-w\) -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
- -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
- \(-w\) -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
- -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs -align array32byte -auto
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
- \(-w\) -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
- -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles
- -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
- \(-w\) -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
- \(-w\) -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
- -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles
- -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
**SPEC CPU®2017 Floating Point Rate Result**

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL380 Gen10 Plus  
(3.60 GHz, Intel Xeon Gold 6334)  

**SPECrater®2017_fp_base = 186**  
**SPECrater®2017_fp_peak = 190**

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<th>Test Date: Jun-2021</th>
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<td>Hardware Availability: Jun-2021</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2020</td>
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</tbody>
</table>

**Peak Compiler Invocation**

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

Benchmarks using both Fortran and C:  
ifort icx

Benchmarks using both C and C++:  
511.povray_r: icpc icc  
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:  
icpx icx ifort

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:  
519.lbm_r: basepeak = yes  
538.imagick_r: basepeak = yes  
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto  
-Ofast -qopt-mem-layout-trans=4  
-fimf-accuracy-bits=14:sqrt  
-mbranches-within-32B-boundaries -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

(Continued on next page)
## Peak Optimization Flags (Continued)

508. namd_r: basepeak = yes

510. parest_r: -w -m64 -W1, -z, muldefs -xCORE-AVX512 -Ofast -ffast-math
  -flto -mfpmath=sse -funroll-loops
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
  -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503. bwaves_r: basepeak = yes

549. fotonik3d_r: basepeak = yes

554. roms_r: -w -m64 -W1, -z, muldefs -xCORE-AVX512 -O3 -ipo
  -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -nOSTandard-realloc-lhs
  -align array32byte -auto -mbranches-within-32B-boundaries
  -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:

521. wrf_r: basepeak = yes

527. cam4_r: basepeak = yes

Benchmarks using both C and C++:

511. povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
  -ipo -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526. blender_r: basepeak = yes

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/HPE-Platform-Flags-Intel-V1.0-ICX-revE.html
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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/HPE-Platform-Flags-Intel-V1.0-ICX-revE.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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