Hewlett Packard Enterprise
ProLiant DL360 Gen10 Plus
(2.40 GHz, Intel Xeon Platinum 8368)

SPECrater®2017_int_base = 543
SPECrater®2017_int_peak = 564

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>543</th>
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<tr>
<td>SPECrate®2017_int_peak</td>
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<th>HPE</th>
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<tr>
<td>Hardware Availability:</td>
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<tr>
<td>Software Availability:</td>
<td>Jun-2021</td>
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<th>Jun-2021</th>
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<tr>
<td>Hardware:</td>
<td>ProLiant DL360 Gen10 Plus (2.40 GHz, Intel Xeon Platinum 8368)</td>
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<tr>
<td>Software:</td>
<td>Red Hat Enterprise Linux 8.3 (Ootpa)</td>
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<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8368</th>
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<tbody>
<tr>
<td>Max MHz:</td>
<td>3400</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled:</td>
<td>76 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 chip(s)</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2:</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3:</td>
<td>57 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Memory:</td>
<td>2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)</td>
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<tr>
<td>Storage:</td>
<td>1 x 800 GB SAS SSD, RAID 0</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 8.3 (Ootpa)</th>
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<tr>
<td>Kernel:</td>
<td>4.18.0-240.el8.x86_64</td>
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<tr>
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<td>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</td>
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<tr>
<td>Parallel:</td>
<td>No</td>
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<td>Firmware:</td>
<td>HPE BIOS Version U46 v1.42 05/26/2021 released May-2021</td>
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<td>File System:</td>
<td>xfs</td>
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<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
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<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
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</tbody>
</table>
Hewlett Packard Enterprise  
(Test Sponsor: HPE) 
ProLiant DL360 Gen10 Plus  
(2.40 GHz, Intel Xeon Platinum 8368) 

SPEC CPU®2017 Integer Rate Result  
Copyright 2017-2021 Standard Performance Evaluation Corporation

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<tr>
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<td>Seconds</td>
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<td>500.perlbench_r</td>
<td>152</td>
<td>619</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>152</td>
<td>539</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>152</td>
<td>287</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>152</td>
<td>656</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>152</td>
<td>240</td>
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<tr>
<td>525.x264_r</td>
<td>152</td>
<td>230</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>152</td>
<td>392</td>
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<tr>
<td>541.leela_r</td>
<td>152</td>
<td>578</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>152</td>
<td>327</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>152</td>
<td>539</td>
</tr>
</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  
Filesysterm 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/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"  
MALLOC_CONF = "retain:true"

**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.:  

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

Hewlett Packard Enterprise
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SPECrate®2017_int_base = 543
SPECrate®2017_int_peak = 564

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

General Notes (Continued)

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.

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 21 10:28:47 EDT 2021
Submission: cpu2017-20210621-27580.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002a0 for the Intel Xeon Platinum 8368 processor.

BIOS Configuration:
- Workload Profile set to General Throughput Compute
- Memory Patrol Scrubbing set to Disabled
- Advanced Memory Protection set to Advanced ECC
- XPT Remote Prefetcher 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
- Intel UPI Link Frequency set to Minimum
- Intel UPI Link Enablement set to Single Link
- D2K set to Disabled
- Workload Profile set to Custom
  - DCU Stream Prefetcher set to Disabled
  - Energy Efficient Turbo set to Enabled
  - Adjacent Sector Prefetcher set to Disabled
  - Intel UPI Link Power Management set to Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Wed Jun 16 01:09:52 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

(Continued on next page)
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Hardware Availability: Jun-2021

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Platform Notes (Continued)

model name : Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
  2 "physical id"s (chips)
  152 "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 : 38
  siblings : 76
  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 32 33 34 35 36 37
  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 32 33 34 35 36 37

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): 152
  On-line CPU(s) list: 0-151
  Thread(s) per core: 2
  Core(s) per socket: 38
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 106
  Model name: Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
  Stepping: 6
  CPU MHz: 2684.633
  BogoMIPS: 4800.00
  Virtualization: VT-x
  L1d cache: 48K
  L1i cache: 32K
  L2 cache: 1280K
  L3 cache: 58368K
  NUMA node0 CPU(s): 0-37,76-113
  NUMA node1 CPU(s): 38-75,114-151
  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 monitoring 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 ibrs_enabled tpr_shadow vnmi flexpriority ept vpid ept_ad
  fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow invpcid cqm rdt_a avx512f avx512dq
  rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_hwi avx512bw
  avx512vl xsavesopt xsaveopt xsavec xgetbv1 xsaveas cqm_llc cqm_occup_llc cqm_mbb_total
  cqm_mbb_local split_lock_detect wbnoinvd dtherm ida arat lm pts avx512vbm umip pku

(Continued on next page)
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

Platform Notes (Continued)

ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 58368 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 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 32 33 34 35 36 37 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94
  95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113
  node 0 size: 963259 MB
  node 0 free: 1011360 MB
  node 1 cpus: 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 64 65 66 67 68 69 70 71 72 73 74 75 114 115 116 117 118 119 120 121 122 123 124 125
  126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147
  148 149 150 151
  node 1 size: 957005 MB
  node 1 free: 1014371 MB
  node distances:
  node 0 size: 963259 MB
  node 1 free: 1011360 MB

From /proc/meminfo
  MemTotal:       2113467728 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)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

(Continued on next page)
Platform Notes (Continued)

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

run-level 3 Jun 15 00:26

SPEC is set to: /home/cpu2017
   Filesystem Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   670G   59G  611G   9% /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
Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
<td></td>
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<th>502.gcc_r(peak)</th>
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<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)</th>
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Hardware Availability: Jun-2021

Tested by: HPE
Software Availability: Jun-2021

CPU2017 License: 3

Compiler Version Notes (Continued)

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<tr>
<td>Fortran</td>
<td>548.exchange2_r(base, peak)</td>
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Software Availability: Jun-2021

Compiler Version Notes (Continued)  
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----------------------------------------------------------

Base Compiler Invocation

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
525.x264_r: -DSPEC_LP64  
531.deepsjeng_r: -DSPEC_LP64  
541.leela_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:  
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmalloc

C++ benchmarks:  
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin

(Continued on next page)
Base Optimization Flags (Continued)

C++ benchmarks (continued):
-1qkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-1qkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icx

500.perlbench_r: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

(Continued on next page)
# SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.40 GHz, Intel Xeon Platinum 8368)  

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**Test Date:** Jun-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Jun-2021

## Peak Optimization Flags (Continued)

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -fno-strict-overflow  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmalloc

502.gcc_r: -m32  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin  
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto  
-O3 -ffast-math -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto  
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_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-revC.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-revC.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.

Tested with SPEC CPU®2017 v1.1.8 on 2021-06-16 01:09:51-0400.  
Report generated on 2021-07-06 18:36:57 by CPU2017 PDF formatter v6442.  
Originally published on 2021-07-06.