**SPEC CPU®2017 Integer Rate Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL110 Gen11  
(3.70 GHz, Intel Xeon Gold 6434)

**SPECrate®2017_int_base = 99.9**  
**SPECrate®2017_int_peak = 103**

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<td>523.xalancbmk_r</td>
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<td>525.x264_r</td>
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<td>531.deepsjeng_r</td>
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<td>541.leela_r</td>
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<td>548.exchange2_r</td>
<td>211</td>
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<tr>
<td>557.xz_r</td>
<td>42.8</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 6434  
Max MHz: 4100  
Nominal: 3700  
Enabled: 8 cores, 1 chip, 2 threads/core  
Orderable: 1 Chip  
Cache L1: 32 KB I + 48 KB D on chip per core  
L2: 2 MB I+D on chip per core  
L3: 22.5 MB I+D on chip per chip  
Other: None  
Memory: 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R)  
Storage: 1 x 480 GB Embedded SATA M.2 drive  
Other: None

**Software**

OS: Red Hat Enterprise Linux 9.0 (Plow)  
Compiler: C/C++, Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;  
Parallel: No  
Firmware: HPE BIOS Version v1.50 (07/12/2023) released Jul-2023  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other: jemalloc memory allocator V5.0.1  
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
Hewlett Packard Enterprise
ProLiant DL110 Gen11
(3.70 GHz, Intel Xeon Gold 6434)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

Test Date: Sep-2023
Hardware Availability: Oct-2023
Software Availability: Dec-2022

Results Table

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</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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>
IRQ balance service was stopped using "systemctl stop irqbalance.service"
tuned-adm profile was set to Accelerator-Performance using "tuned-adm profile accelerator-performance"
perf-bias for all the CPUs is set using "cpupower set -b 0"
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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 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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

Platform Notes

The system ROM used for this result contains Intel microcode version 0x2b0004b1 for
the Intel Xeon Gold 6434 processor.
BIOS Configuration:
Workload Profile set to General Throughput Compute
Thermal Configuration set to Maximum Cooling
Enhanced Processor Performance Profile set to Aggressive
Last Level Cache (LLC) Dead Line Allocation set to Disabled
Memory Patrol Scrubbing set to Disabled
Workload Profile set to Custom
DCU Stream Prefetcher set to Disabled
Adjacent Sector Prefetch set to Disabled
Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: e6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Wed Sep 6 15:46:10 2023
SUT (System Under Test) info as seen by some common utilities.

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14. cpupower frequency-info
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20. Disk information
21. `/sys/devices/virtual/dmi/id`
22. `dmidecode`
23. BIOS

------------------------------------------------------------
1. `uname -a`
   Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. `w`
   15:46:20 up 2 min,  0 users, load average: 0.02, 0.02, 0.00
   USER   TTY       LOGIN@   IDLE   JCPU   PCPU WHAT

3. `Username`
   From environment variable $USER: root

4. `ulimit -a`
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-i) 1029838
   max locked memory (kbytes, -l) 64
   max memory size (kbytes, -m) unlimited
   open files (-n) 1024
   pipe size (512 bytes, -p) 8
   POSIX message queues (bytes, -q) 819200
   real-time priority (-r) 0
   stack size (kbytes, -s) unlimited
   cpu time (seconds, -t) unlimited
   max user processes (-u) 1029838
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. `sysinfo process ancestry`
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   ssdh: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   ssdh: root [priv]
   ssdh: root@notty
   bash -c cd $SPEC/ & & $SPEC/intrate.sh
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=16 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=8 --define physicalfirst
   --define no numa --tune base,peak --output_format all --define drop_caches intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=16 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=8 --define physicalfirst
   --define no numa --tune base,peak --output_format all --define drop_caches intrate --nopower --runmode rate --tune
   base:peak --size refrain intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.003/templogs/preenv.intrate.003.0.log --lognum 003.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo

(Continued on next page)
Platform Notes (Continued)

```bash
$SPEC = /home/cpu2017
```

6. /proc/cpuinfo

```bash
model name      : Intel(R) Xeon(R) Gold 6434
vendor_id       : GenuineIntel
cpu family      : 6
model           : 143
stepping        : 7
microcode       : 0x2b0004b1
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores       : 8
siblings        : 16
1 physical ids (chips)
16 processors (hardware threads)
physical id 0: core ids 0-7
physical id 0: apicids 0-15
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.
```

7. lscpu

From lscpu from util-linux 2.37.4:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Address sizes:** 46 bits physical, 57 bits virtual
- **Byte Order:** Little Endian
- **CPU(s):** 16
- **On-line CPU(s) list:** 0-15
- **Vendor ID:** GenuineIntel
- **BIOS Vendor ID:** Intel(R) Corporation
- **Model name:** Intel(R) Xeon(R) Gold 6434
- **BIOS Model name:** Intel(R) Xeon(R) Gold 6434
- **CPU family:** 6
- **Model:** 143
- **Thread(s) per core:** 2
- **Core(s) per socket:** 8
- **Socket(s):** 1
- **Stepping:** 7
- **BogoMIPS:** 7400.00
- **Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 cplflush dts acpi mmx fxsr ss sse2 sse3 sse4_1sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cat_d3 cdp_13
- **Virtualization:** VT-x
- **L1d cache:** 384 KiB (8 instances)
Platform Notes (Continued)

L1i cache: 256 KiB (8 instances)
L2 cache: 16 MiB (8 instances)
L3 cache: 22.5 MiB (1 instance)
NUMA node(s): 1
Vulnerability Itlb multihit: Not affected
Vulnerability L1f: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

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<th>ALL-SIZE</th>
<th>WAYS</th>
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<td>24576</td>
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</table>

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0-15
node 0 size: 257499 MB
node 0 free: 256565 MB
node distances:
node   0
distance: 0
0: 10

9. /proc/meminfo
MemTotal: 263679308 kB

10. who -r
run-level 3 Sep 6 15:44

11. Systemd service manager version: systemd 250 (250-6.e19_0)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chrony crond
dbus-broker firewall getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd
systemd-network-generator tuned udisks2
enabled-runtime systemd-remount-fs
disabled blk-availability chrony-wait console-getty cpupower debug-shell hwloc-dump-hwdata kvm_stat
man-db-restart-cache-update nftables powertop rdisc rsh rshm-facts rpmdb-rebuild
serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-patome systemd-sysext
sssd-autofs sssd-kcm sssd-ksm sssd-nss sssd-pam ssds-ssh sssd-sudo

(Continued on next page)
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</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2022</td>
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</tbody>
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**Platform Notes (Continued)**

13. Linux kernel boot-time arguments, from /proc/cmdline
   
   BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
   root=/dev/mapper/rhel-root
   ro
   resume=/dev/mapper/rhel-swap
   rd.lvm.lv=rhel/root
   rd.lvm.lv=rhel/swap

14. cpupower frequency-info
   analyzing CPU 0:
   Unable to determine current policy
   boost state support:
   Supported: yes
   Active: yes

15. tuned-adm active
   Current active profile: accelerator-performance

16. sysctl
   
   kernel.numa_balancing  0
   kernel.randomize_va_space  2
   vm.compaction_proactive  10
   vm.dirty_background_bytes  0
   vm.dirty_background_ratio  10
   vm.dirty_bytes  0
   vm.dirty_expire_centisecs  3000
   vm.dirty_ratio  40
   vm.dirty_writeback_centisecs  500
   vm.dirtytime_expire_seconds  43200
   vm.extfrag_threshold  500
   vm.min_unmapped_ratio  1
   vm.nr_hugepages  0
   vm.nr_hugepages_mempolicy  0
   vm.nr_overcommit_hugepages  0
   vm.swappiness  10
   vm.watermark_boost_factor  15000
   vm.watermark_scale_factor  10
   vm.zone_reclaim_mode  0

17. /sys/kernel/mm/transparent_hugepage
   
   defrag always defer defer+madvise [madvise] never
   enabled [always] madvise never
   hpage_pmd_size 2097152
   shmem_enabled always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
   
   alloc_sleep_millisecs  60000
   defrag  1
   max_ptes_none  511
   max_ptes_shared  256
   max_ptes_swap  64
   pages_to_scan  4096
   scan_sleep_millisecs  10000

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Test Sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

19. OS release
From /etc/*-release /etc/*-version
os-release Red Hat Enterprise Linux 9.0 (Plow)
redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
system-release Red Hat Enterprise Linux release 9.0 (Plow)

------------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017
   Filesystem            Type   Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home  xfs    372G   83G  289G  23%   /home

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL110 Gen11
Product Family: ProLiant
Serial:         7CE244P9LL

------------------------------------------------------------
22. dmidecode
Additional information from dmidecode 3.3 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:
7x Hynix HMCGB8MEBRA113N 32 GB 2 rank 4800
1x Hynix HMCGB8MEBRA115N 32 GB 2 rank 4800

------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:        HPE
   BIOS Version:       1.50
   BIOS Date:          07/12/2023
   BIOS Revision:      1.50
   Firmware Revision:  1.30

Compiler Version Notes

--------------------------------------------------------------------------------------------------------------------------
| C       | 502.gcc_r(peak) |
|-------------------------------------------------------------|
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201 |
| Copyright (C) 1985-2022 Intel Corporation. All rights reserved. |
--------------------------------------------------------------------------------------------------------------------------

--------------------------------------------------------------------------------------------------------------------------
| C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak) |
|-------------------------------------------------------------|
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201 |
| Copyright (C) 1985-2022 Intel Corporation. All rights reserved. |
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**Test Date:** Sep-2023  
**Test Sponsor:** HPE  
**Hardware Availability:** Oct-2023  
**Tested by:** HPE  
**Software Availability:** Dec-2022

### Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

```
------------------------------------------------------------------------------------------------------------
| C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak) |
------------------------------------------------------------------------------------------------------------

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

```

```
------------------------------------------------------------------------------------------------------------
| C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak) |
------------------------------------------------------------------------------------------------------------

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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```

```
------------------------------------------------------------------------------------------------------------
| Fortran | 548.exchange2_r(base, peak) |
------------------------------------------------------------------------------------------------------------

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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```

### Base Compiler Invocation

**C benchmarks:**  
icx

**C++ benchmarks:**  
icpx

**Fortran benchmarks:**  
ifx

### 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  
```

(Continued on next page)
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL110 Gen11
(3.70 GHz, Intel Xeon Gold 6434)

SPECrate®2017_int_base = 99.9
SPECrate®2017_int_peak = 103

Base Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL110 Gen11
(3.70 GHz, Intel Xeon Gold 6434)

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

Peak Portability Flags (Continued)

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:

500.perlbench_r: -w -std=c11 -m64 -Wl,-z,muldefs
-ffast-math -flto -Ofast -xCORE-AVX2 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -fno-strict-overflow
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -ffast-math -flto -std=c11
-ffast-math -flto -mfpmath=sse -funroll-loops
-fno-alias -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL110 Gen11
(3.70 GHz, Intel Xeon Gold 6434)

SPECrate®2017_int_base = 99.9
SPECrate®2017_int_peak = 103

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

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<table>
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<tr>
<td>Test Date:</td>
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<td>Oct-2023</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

Peak Optimization Flags (Continued)

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-SPR-rev2.4.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev2.4.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 v1.1.9 on 2023-09-06 06:16:20-0400.
Report generated on 2024-01-29 18:11:01 by CPU2017 PDF formatter v6716.
Originally published on 2023-10-10.