Hewlett Packard Enterprise
ProLiant ML30 Gen11
(3.20 GHz, Intel Xeon E-2488)

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

SPECrate®2017_int_base = 99.9
SPECrate®2017_int_peak = 104

| Test Date:               | Hardware Availability: Dec-2023
|--------------------------|-------------------------------
| Software Availability:   | Dec-2023                      |

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E-2488</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>5600</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3200</td>
</tr>
<tr>
<td>Enabled:</td>
<td>8 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 Chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>2 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>24 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>64 GB (2 x 32 GB 2Rx8 PC5-5600B-E, running at 4400)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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**Software**

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 SP4</th>
</tr>
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<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++, Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;</td>
</tr>
<tr>
<td>Parallel:</td>
<td>No</td>
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<tr>
<td>Firmware:</td>
<td>HPE BIOS Version v1.40 10/18/2023 released Oct-2023</td>
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<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 5 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
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<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 and OS set to prefer performance at the cost of additional power usage</td>
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<table>
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<th>Copies</th>
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<th>SPECrate®2017_int_peak</th>
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<td>502.gcc_r</td>
<td>16</td>
<td>81.0</td>
<td>105</td>
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<td>541.leela_r</td>
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SPECrate®2017_int_base (99.9) | SPECrate®2017_int_peak (104)
# SPEC CPU®2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML30 Gen11  
(3.20 GHz, Intel Xeon E-2488)

---

## Results Table

<table>
<thead>
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<th>Benchmark</th>
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<th>Ratio</th>
<th>Seconds</th>
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**SPECrate®2017_int_base = 99.9**  
**SPECrate®2017_int_peak = 104**

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## 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`
- `tuned-adm profile` was set to Throughput-Performance using "tuned-adm profile throughput-performance"

---

## 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

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(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML30 Gen11
(3.20 GHz, Intel Xeon E-2488)

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

SPECrate®2017_int_base = 99.9
SPECrate®2017_int_peak = 104

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Dec-2023

General Notes (Continued)


Platform Notes

The system ROM used for this result contains Intel microcode version 0x11f for the Intel Xeon E-2488 processor.

BIOS Configuration:
Workload Profile set to General Throughput Compute
Thermal Configuration set to Maximum Cooling
Enhanced Processor Performance Profile set to Enabled

Sysinfo program /home/Cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Fri Nov 24 15:12:18 2023

SUT (System Under Test) info as seen by some common utilities.

Table of contents
------------------------------------------------------------
1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
9. /proc/meminfo
10. who --r
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
------------------------------------------------------------

1. uname -a
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux

2. w
15:12:18 up 3 min, 3 users, load average: 0.25, 0.22, 0.10
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root : : 29Apr22 7xdm? 9.28s 0.00s gdm-session-worker [pam/gdm-password]
root :1 1: 29Apr22 7xdm? 9.28s 0.00s /usr/lib/gdm/gdm-x-session
--register-session --run-script gnome
root pts/1 172.17.1.13 29Apr22 10.00s 0.58s 0.00s -bash

(Continued on next page)
**Platform Notes (Continued)**

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

4. **ulimit -a**
   - core file size (blocks, -c) unlimited
   - data seg size (kbytes, -d) unlimited
   - scheduling priority (-e) 0
   - file size (blocks, -f) unlimited
   - pending signals (-i) 256711
   - max locked memory (kbytes, -l) 64
   - max memory size (kbytes, -m) unlimited
   - open files (-n) 1024
   - pipe size (512 bytes, -p) 8
   - POSIX message queue (bytes, -q) 819200
   - real-time priority (-r) 0
   - stack size (kbytes, -s) unlimited
   - cpu time (seconds, -t) unlimited
   - max user processes (-u) 256711
   - virtual memory (kbytes, -v) unlimited
   - file locks (-x) unlimited

5. **sysinfo process ancestry**
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root@pts/1
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=16 -c
   ic2023.2.3-lin-core-avx2-rate-20231121.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
   ic2023.2.3-lin-core-avx2-rate-20231121.cfg --define smt-on --define cores=8 --define physicalfirst
   --define no-numa --tune base,peak --output_format all --define drop_caches --nopower --runmode rate --tune
   base:peak --size intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.002/templogs/preenv.intrate.002.0.log --lognum 002.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/Cpu2017

6. **/proc/cpuinfo**
   - model name: Intel(R) Xeon(R) E E-2488
   - vendor_id: GenuineIntel
   - cpu family: 6
   - model: 183
   - stepping: 1
   - microcode: 0x11f
   - 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.

(Continued on next page)
7. lscpu

From lscpu from util-linux 2.37.2:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 48 bits virtual
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) E-2488
CPU family: 6
Model: 183
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 1
Stepping: 1
BogoMIPS: 6374.40
```

Flags:
```
fpu vme de pae mce cmov pat pse sse sse2 ss ht tm pse36 clflush dts acpi mmx fxsr sse ept tsc msr pae mce cx8 apic
``` 

Virtualization: VT-x

L1d cache: 384 KiB (8 instances)
L1i cache: 256 KiB (8 instances)
L2 cache: 16 MiB (8 instances)
L3 cache: 24 MiB (1 instance)
NUMA node(s): 1
NUMA node0 CPU(s): 0-15
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spectre store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsc async abort: Not affected

From lscpu --cache:
```
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 384K 12 Data 1 64 1 64
L1i 32K 256K 8 Instruction 1 64 1 64
L2 2M 16M 16 Unified 2 2048 1 64
L3 24M 24M 12 Unified 3 32768 1 64
```

From numactl --hardware:
```
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0-15
```

(Continued on next page)
Platform Notes (Continued)

- node 0 size: 64202 MB
- node 0 free: 62384 MB
- node distances:
  0: 10

9. /proc/meminfo
   MemTotal: 65743620 kB

10. who -r
    run-level 5 Apr 29 17:30

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
    Default Target Status
    graphical running

12. Services, from systemctl list-unit-files
    STATE UNIT FILES
    enabled ModemManager YaST2-Firstboot YaST2-Second-Stage apparmor auditd bluetooth cron
display-manager firewalld getty@ haveged irqbalance iscsi issue-generator kbdsettings lvm2-monitor
postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcpc4 wickedd-dhcpc6
wickedd-nanny wpa_supplicant
    enabled-runtime systemd-remount-fs
    disabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon
appstream-sync-cache autofs autoyast-initscripts blk-availability bluetooth-mesh
boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed
debug-shell dmsaid-activation dnsmasq etables exchange-hmc-os-info gpm grub2- once
haveged-switch-root ipmi ipmieliwd iscsid-init iscsid iscsiio issue-add-ssh-keys kekexec-load
lummask man-db-create multipathd nfs nfs-bmap nm-cloud-setup nmb openvpn@ ostree-remount
pppoe pppoe-server rdisc rpmbind rpmconfigcheck rsysd rtkit-daemon serial-getty8
smartd_generate_opts smb snmpd snmptrapd speech-dispatcher systemd-boot-check-no-failures
systemd-network-generator systemd-aysext systemd-time-wait-sync systemd-timesyncd tuned
udisks2 upower wpa_supplicant@
    indirect pcscd saned@ wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=f27d316d-8e93-407b-bb4e-bb9b59112f6c
    splash=silent
    resume=/dev/disk/by-uuid/e90ee60f-c9c6-49d9-8120-85942413fb15
    mitigations=auto
    quiet
    security=apparmor

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: throughput-performance

(Continued on next page)
**Platform Notes (Continued)**

16. `sysctl`
   - `kernel.numa_balancing`: 0
   - `kernel.randomize_va_space`: 2
   - `vm.compaction_proactiveness`: 20
   - `vm.dirty_background_bytes`: 0
   - `vm.dirty_background_ratio`: 10
   - `vm.dirty_bytes`: 0
   - `vm.dirty_expire_centisecs`: 3000
   - `vm.dirty_ratio`: 20
   - `vm.dirty_writeback_centisecs`: 500
   - `vm.dirtytime_expire_seconds`: 43200
   - `vm.extrfag_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

19. OS release
   - From `/etc/*-release` /etc/*-version
   - `os-release` SUSE Linux Enterprise Server 15 SP4

20. Disk information
   - SPEC is set to: `/home/Cpu2017`
   - `Filesystem` `Type` `Size` `Used` `Avail` `Use%` `Mounted on`
     - `/dev/sda5` `xfs` 302G 101G 202G 34% `/home`

21. `/sys/devices/virtual/dmi/id`
   - `Vendor`: HPE
   - `Product`: ProLiant ML30 Gen11
   - `Product Family`: ProLiant
   - `Serial`: LXVBT01BHVZ03N

22. `dmidecode`
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML30 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPECrate®2017_int_base = 99.9
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

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:
2x Hynix HMCG88AGBEA084N 32 GB 2 rank 5600, configured at 4400

Compiler Version Notes

<table>
<thead>
<tr>
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Hewlett Packard Enterprise
ProLiant ML30 Gen11
(3.20 GHz, Intel Xeon E-2488)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Test Sponsor: HPE
Hardware Availability: Dec-2023
Test Date: Nov-2023
Software Availability: Dec-2023

Specrate®2017_int_base = 99.9
Specrate®2017_int_peak = 104

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

Compiler Version Notes (Continued)

------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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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.leelar_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-AVX2 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-1qkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-1qkmalloc

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

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -gopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/home/specdev/new_compilers/ic2023.2.3/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
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
-fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto

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

500.perlbench_r (continued):
-Ofast -ffast-math -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-strict-overflow
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto
-Ofast -ffast-math -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -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-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-alias
-L/home/specdev/new_compilers/ic2023.2.3/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-RPL-rev2.0.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-RPL-rev2.0.xml
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| Test Date: Nov-2023             |
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| Software Availability: Dec-2023 |

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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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