Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380a Gen11
(2.00 GHz, Intel Xeon Gold 6438Y+)

SPECrater®2017_int_base = 559
SPECrater®2017_int_peak = 576

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

Software
OS: Red Hat Enterprise Linux 9.0 (Plow)
Kernel 5.14.0-70.13.1.el9_0.x86_64
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 v1.40 06/1/2023 released
Jun-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

Hardware
CPU Name: Intel Xeon Gold 6438Y+
Max MHz: 4000
Nominal: 2000
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 1, 2 chip(s)
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 60 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 1.6 TB NVMe SSD
Other: None

Test Date: Jul-2023
Hardware Availability: Jun-2023
Software Availability: Dec-2022

500.perlbench_r 128
502.gcc_r 128
505.mcf_r 128
520.omnetpp_r 128
523.xalancbmk_r 128
525.x264_r 128
531.deepsjeng_r 128
541.leela_r 128
548.exchange2_r 128
557.xz_r 128
SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise
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ProLiant DL380a Gen11
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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This result is left in the SPEC results database for historical reference.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 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
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"
## SPEC CPU®2017 Integer Rate Result

### Hewlett Packard Enterprise

(3.00 GHz, Intel Xeon Gold 6138G+)

**SPECrate®2017_int_base = 559**

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<td>Software Availability: Dec-2022</td>
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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.


### Platform Notes

The system ROM used for this result contains Intel microcode version 0x2b000461 for the Intel Xeon Gold 6438Y+ Processor

**BIOS Configuration**

- Workload Profile set to General Throughput Compute
- Memory Patrol Scrubbing set to Disabled
- Last Level Cache (LLC) Dead Line Allocation set to Disabled
- Intel UPI Link Enablement set to Single Link
- Enhanced Processor Performance Profile set to Aggressive
- Thermal Configuration set to Maximum Cooling
- Workload Profile set to Custom
- Adjacent Sector Prefetch set to Disabled
- DCU Stream Prefetcher set to Disabled
- Intel UPI Link Power Management set to Enabled
- Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c6a2c92cc097bec197

running on localhost.localdomain Sat Jul 15 12:31:38 2023

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

---

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18. /sys/kernel/mm/transparent_hugepage/krhugepaged
19. OS release
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
12:31:38 up 1 min, 0 users, load average: 1.58, 0.61, 0.22
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) 2062702
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) 2062702
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 18
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@notty
bash -c cd $SPEC/ && $SPEC/intrate.sh
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
--runmode rate --tune base:peak --size reftate intrate --nopreenv --note-preenv --logfile

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ProLiant DL380a Gen11
(2.00 GHz, Intel Xeon Gold 6438Y+)

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Hardware Availability: Jun-2023
Software Availability: Dec-2022

Platform Notes (Continued)

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Gold 6438Y+
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 7
   microcode : 0x2b000461
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 32
   siblings : 64
   2 physical ids (chips)
   128 processors (hardware threads)
   physical id 0: core ids 0-31
   physical id 1: core ids 0-31
   physical id 0: apic ids 0-63
   physical id 1: apic ids 128-191
   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): 128
   On-line CPU(s) list: 0-127
   Vendor ID: GenuineIntel
   BIOS Vendor ID: Intel(R) Corporation
   Model name: Intel(R) Xeon(R) Gold 6438Y+
   BIOS Model name: Intel(R) Xeon(R) Gold 6438Y+
   CPU family: 6
   Model: 143
   Thread(s) per core: 2
   Core(s) per socket: 32
   Socket(s): 2
   Stepping: 7
   Flags:
   - fpu vme de pse tsc msr pae mca cmov pat pse36
   - cflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdwtsc
   - lm constant_tsc art arch_perfmon pebs bts rep_good mep nocpl xtopology
   - nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
des_cpl amx est tm2 ssse3 sbdkg fma cx16 xtpr pdcm pcid dca sse4_1 asee_2
   - x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand iahf_lmm
   - abm 3dnowprefetch cpuid_fault eph cat_l3 cat_l2 cd_pdp l3 invpcid_single
cd_pld mba ibrs ibpb ibs_enhanced fsagbase ts_adjust bmi1
   - avx2 smep bni2 erms invpcid cmq rdt_a avx512f avx512d qdsed adx smap
   - avx512ifma cliflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
   - xsaveopt xsaves xgetenvv xsave xsaves qcm_11c qcm_occup_11c qcm_mbb_total
   - qcm_mbb_local split_lock_detect avx_vnni avx512_bf16 wbinvd dtherm ida
   - arat pln pts avx512vbm umip plt oskei waiptkg avx512_vbm2 gfini vae
   - vpcmrlqdq avx512_vnni avx512_vbitalg tme avx512_vppcndtg ia57 rdpid
   - bus_lock_detect cidemote movdir movdir64b enqcmd farm md_clear serialize

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Platform Notes (Continued)
	sxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities

L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 128 MiB (64 instances)
L3 cache: 120 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-31, 64-95
NUMA node1 CPU(s): 32-63, 96-127
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spectre v1: Mitigation; speculative store bypass disabled via prctl
Vulnerability Spectre v2: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Srbdms: Not affected
Vulnerability Txs async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 3M 12 Data 1 64 1 64
L1i 32K 2M 8 Instruction 1 64 1 64
L2 2M 128M 16 Unified 2 2048 1 64
L3 60M 120M 15 Unified 3 65536 1 64

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-31, 64-95
node 0 size: 257691 MB
node 0 free: 256331 MB
node 1 cpus: 32-63, 96-127
node 1 size: 258023 MB
node 1 free: 257169 MB
node distances:
node   0   1
0:  10  20
1:  20  10

9. /proc/meminfo
MemTotal: 528092532 kB

10. who -r
run-level 3 Jul 15 12:30

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 crond
dbus-broker firewalld getty@ irqbalance kpinger lvm2-monitor mdmonitor microcode
nis-domainname rshcmd rsyslog selinux-autorelabel-mark sshd sssd
tuned-systemd-network-generator tuned-udisks2

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Platform Notes (Continued)

enabled-runtime systemd-remount-fs
disabled blk-availability chrony-wait chronyd console-getty cpupower debug-shell kvm_stat
man-db-restart-cache-update nftables powertop rdisc rhsm rhsm-facts rpmdb-rebuild
serial-getty sshd-keygen systemd-boot-check-no-failures systemd-patrole systemd-sysext
indirect sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-sh ssh sshd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.e19_0.x86_64
root=/devmapper/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 1
   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 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
   always defer+adviser [adviser] never
   enabled [always] never
   hpaged_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

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Platform Notes (Continued)

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 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 1.4T 153G 1.3T 11% /home

21. /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL380a Gen11
Product Family: ProLiant
Serial: CNX22662MZ

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 HMCG88AEBRA168N 32 GB 2 rank 4800
6x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800
3x Hynix HMCG88MEBRA115N 32 GB 2 rank 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: HPE
BIOS Version: 1.40
BIOS Date: 06/01/2023
BIOS Revision: 1.40
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)

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**Compiler Version Notes (Continued)**

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

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Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL380a Gen11  
(2.00 GHz, Intel Xeon Gold 6438Y+)  

**Base 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

**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
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(pass 1)
    -flto -Ofast -xCORE-AVX512 -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 -fprofile-generate(pass 1)
    -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
    -flto -Ofast -xCORE-AVX512 -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 -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:

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

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**SPECrate®2017_int_base = 559**

**SPECrate®2017_int_peak = 576**

**Peak Optimization Flags (Continued)**

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-SPR-rev2.1.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-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-SPR-rev2.1.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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