



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

New H3C Technologies Co., Ltd.

H3C UniServer R4900 G6 Ultra (Intel Xeon Gold 5520+)

SPECrate®2017_int_base = 523

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9066

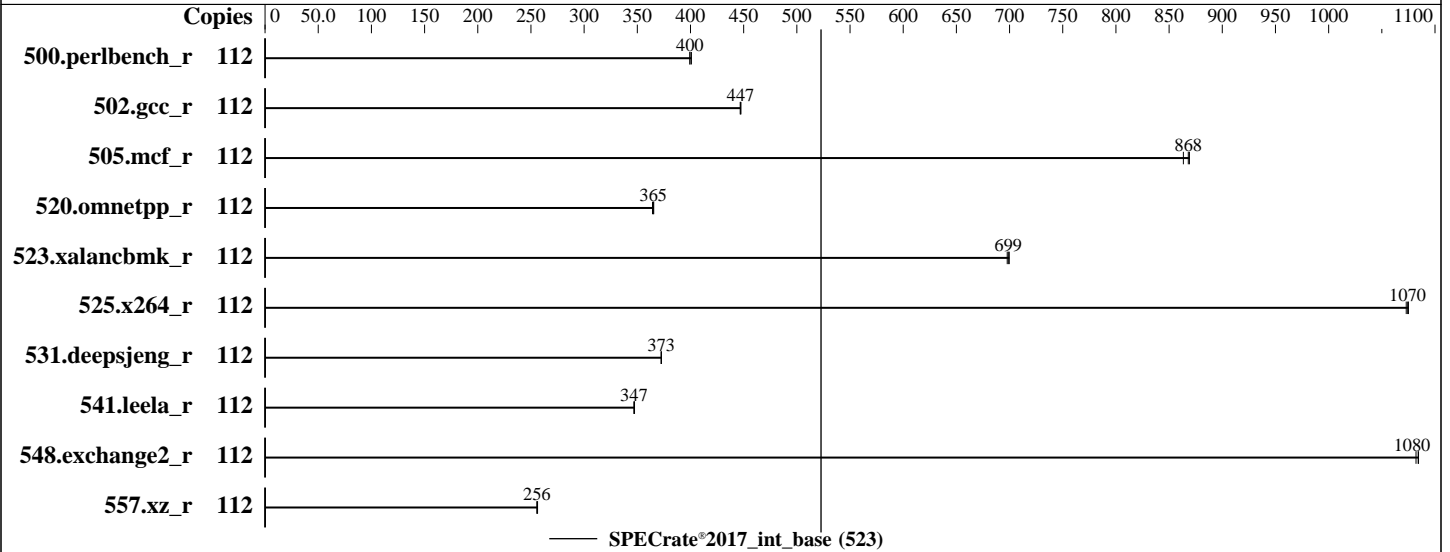
Test Sponsor: New H3C Technologies Co., Ltd.

Tested by: New H3C Technologies Co., Ltd.

Test Date: Aug-2024

Hardware Availability: Oct-2023

Software Availability: Mar-2024



Hardware

CPU Name: Intel Xeon Gold 5520+
 Max MHz: 4000
 Nominal: 2200
 Enabled: 56 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 52.5 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R, running at 4800)
 Storage: 1 x 3.2 TB NVME SSD
 Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP5
 5.14.21-150500.53-default
 Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
 Parallel: No
 Firmware: Version 6.10.43 released Jul-2024 BIOS
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: None
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.



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Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|-----------------|--------|------------|-------------|------------|------------|------------|------------|--------|---------|-------|---------|-------|---------|-------|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 500.perlbench_r | 112 | 446 | 400 | 446 | 399 | 445 | 401 | | | | | | | |
| 502.gcc_r | 112 | 355 | 447 | 355 | 447 | 355 | 447 | | | | | | | |
| 505.mcf_r | 112 | 209 | 868 | 208 | 869 | 210 | 863 | | | | | | | |
| 520.omnetpp_r | 112 | 403 | 364 | 402 | 365 | 403 | 365 | | | | | | | |
| 523.xalancbmk_r | 112 | 169 | 699 | 169 | 700 | 169 | 698 | | | | | | | |
| 525.x264_r | 112 | 183 | 1070 | 182 | 1080 | 183 | 1070 | | | | | | | |
| 531.deepsjeng_r | 112 | 344 | 373 | 345 | 373 | 345 | 372 | | | | | | | |
| 541.leela_r | 112 | 534 | 347 | 535 | 347 | 535 | 347 | | | | | | | |
| 548.exchange2_r | 112 | 271 | 1080 | 271 | 1080 | 271 | 1080 | | | | | | | |
| 557.xz_r | 112 | 473 | 256 | 473 | 256 | 472 | 256 | | | | | | | |

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/specpunew/lib/intel64:/home/specpunew/lib/ia32:/home/specpunew/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
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>
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.



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Platform Notes

BIOS Settings:

SNC = Enable SNC2 (2-clusters)
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Performance

Sysinfo program /home/specpunew/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Aug 22 17:57:17 2024

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

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23. BIOS

```
1. uname -a
Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
17:57:17 up 16 min,  2 users,  load average: 0.01, 0.03, 0.00
USER      TTY      FROM          LOGIN@      IDLE        JCPU   PCPU WHAT
root     tty1      -              17:55       13.00s    0.88s   0.01s sh intrate.sh
root     pts/0    172.16.27.225 17:54       29.00s    0.15s   0.15s -bash
```

```
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
```

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Platform Notes (Continued)

```

file size                (blocks, -f) unlimited
pending signals          (-i) 4124718
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) 4124718
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
sh intrate.sh
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=112 -c
  ic2024.1-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=56 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=112 --configfile
  ic2024.1-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=56 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
  rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/specpunew

```

```

-----
6. /proc/cpuinfo
model name      : INTEL(R) XEON(R) GOLD 5520+
vendor_id      : GenuineIntel
cpu family     : 6
model          : 207
stepping      : 2
microcode     : 0x21000200
bugs          : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores     : 28
siblings      : 56
2 physical ids (chips)
112 processors (hardware threads)
physical id 0: core ids 0-27
physical id 1: core ids 0-27
physical id 0: apicids 0-55
physical id 1: apicids 128-183
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:         52 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                112

```

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Platform Notes (Continued)

```

On-line CPU(s) list:          0-111
Vendor ID:                   GenuineIntel
Model name:                  INTEL(R) XEON(R) GOLD 5520+
CPU family:                  6
Model:                       207
Thread(s) per core:         2
Core(s) per socket:         28
Socket(s):                   2
Stepping:                    2
CPU max MHz:                 4000.0000
CPU min MHz:                 800.0000
BogoMIPS:                    4400.00
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 tsc_known_freq pni pclmulqdq dtes64 monitor
                               ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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 cat_l2 cdp_l3
                               invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                               vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep
                               bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
                               avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
                               xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                               cqm_mbm_local avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                               hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg
                               avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                               avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                               enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                               amx_tile flush_lld arch_capabilities

Virtualization:              VT-x
L1d cache:                   2.6 MiB (56 instances)
L1i cache:                   1.8 MiB (56 instances)
L2 cache:                    112 MiB (56 instances)
L3 cache:                    105 MiB (2 instances)
NUMA node(s):                4
NUMA node0 CPU(s):          0-13,56-69
NUMA node1 CPU(s):          14-27,70-83
NUMA node2 CPU(s):          28-41,84-97
NUMA node3 CPU(s):          42-55,98-111
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:         Not affected
Vulnerability Mds:          Not affected
Vulnerability Meltdown:     Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed:     Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:    Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2:    Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBR SB-eIBRS SW
                               sequence
Vulnerability Srbds:         Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

| NAME | ONE-SIZE | ALL-SIZE | WAYS | TYPE | LEVEL | SETS | PHY-LINE | COHERENCY-SIZE |
|------|----------|----------|------|-------------|-------|-------|----------|----------------|
| L1d | 48K | 2.6M | 12 | Data | 1 | 64 | 1 | 64 |
| L1i | 32K | 1.8M | 8 | Instruction | 1 | 64 | 1 | 64 |
| L2 | 2M | 112M | 16 | Unified | 2 | 2048 | 1 | 64 |
| L3 | 52.5M | 105M | 15 | Unified | 3 | 57344 | 1 | 64 |

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Platform Notes (Continued)

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```
available: 4 nodes (0-3)
node 0 cpus: 0-13,56-69
node 0 size: 257545 MB
node 0 free: 256298 MB
node 1 cpus: 14-27,70-83
node 1 size: 258040 MB
node 1 free: 257452 MB
node 2 cpus: 28-41,84-97
node 2 size: 258040 MB
node 2 free: 257469 MB
node 3 cpus: 42-55,98-111
node 3 size: 257582 MB
node 3 free: 257018 MB
node distances:
node  0  1  2  3
  0:  10  12  21  21
  1:  12  10  21  21
  2:  21  21  10  12
  3:  21  21  12  10
```

9. /proc/meminfo

MemTotal: 1055958556 kB

10. who -r

run-level 3 Aug 22 17:41

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)

```
Default Target Status
multi-user      running
```

12. Services, from systemctl list-unit-files

```
STATE          UNIT FILES
enabled        YaST2-Firstboot YaST2-Second-Stage apparmor cron display-manager getty@ issue-generator
                kbdsettings klog lvm2-monitor nscd nvme-fc-boot-connections purge-kernels rollback rsyslog
                smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime
disabled       auditd autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates
                chrony-wait chronyd console-getty cups cups-browsed debug-shell ebttables
                exchange-bmc-os-info fancontrol firewalld gpm grub2-once haveged haveged-switch-root ipmi
                ipmievd irqbalance issue-add-ssh-keys kdump kdump-early kexec-load lm_sensors lunmask
                man-db-create multipathd nfs nfs-blkmap nmb nvme-autoconnect postfix rpcbind
                rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd sysstat
                systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                systemd-time-wait-sync systemd-timesyncd tuned vncserver@
indirect       pcsd wickedd
```

13. Linux kernel boot-time arguments, from /proc/cmdline

```
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=befabla9-6492-412a-9d0b-079466ad03eb
splash=silent
resume=/dev/disk/by-uuid/64b85326-8619-4fcb-8127-1e8683bd7471
mitigations=auto
```

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Platform Notes (Continued)

```
quiet
security=apparmor
crashkernel=403M,high
crashkernel=72M,low
```

```
-----
14. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 4.00 GHz.
                   The governor "performance" may decide which speed to use
                   within this range.

  boost state support:
    Supported: yes
    Active: yes
-----
```

```
-----
15. tuned-adm active
Current active profile: throughput-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                  20
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+madvice [madvice] never
enabled         [always] madvice 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
-----
```

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Platform Notes (Continued)

From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP5

20. Disk information
SPEC is set to: /home/speccpunew
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p5 xfs 522G 440G 83G 85% /home

21. /sys/devices/virtual/dmi/id
Vendor: New H3C Technologies Co., Ltd.
Product: H3C UniServer R4900 G6 Ultra
Product Family: Rack
Serial: 210235A4CHH244000018

22. dmidecode
Additional information from dmidecode 3.4 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:
16x Hynix HMC94AHBRA487N 64 GB 2 rank 6400, configured at 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 6.10.43
BIOS Date: 07/27/2024
BIOS Revision: 5.32

Compiler Version Notes

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

C++ | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

Fortran | 548.exchange2_r(base)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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
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/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc
```



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Software Availability: Mar-2024

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html>

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-SPR-RevE.html

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml>

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-SPR-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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