



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SD530 V3
(1.90 GHz, Intel Xeon Platinum 8592+)

SPECspeed®2017_int_base = 14.4

SPECspeed®2017_int_peak = Not Run

CPU2017 License: 9017

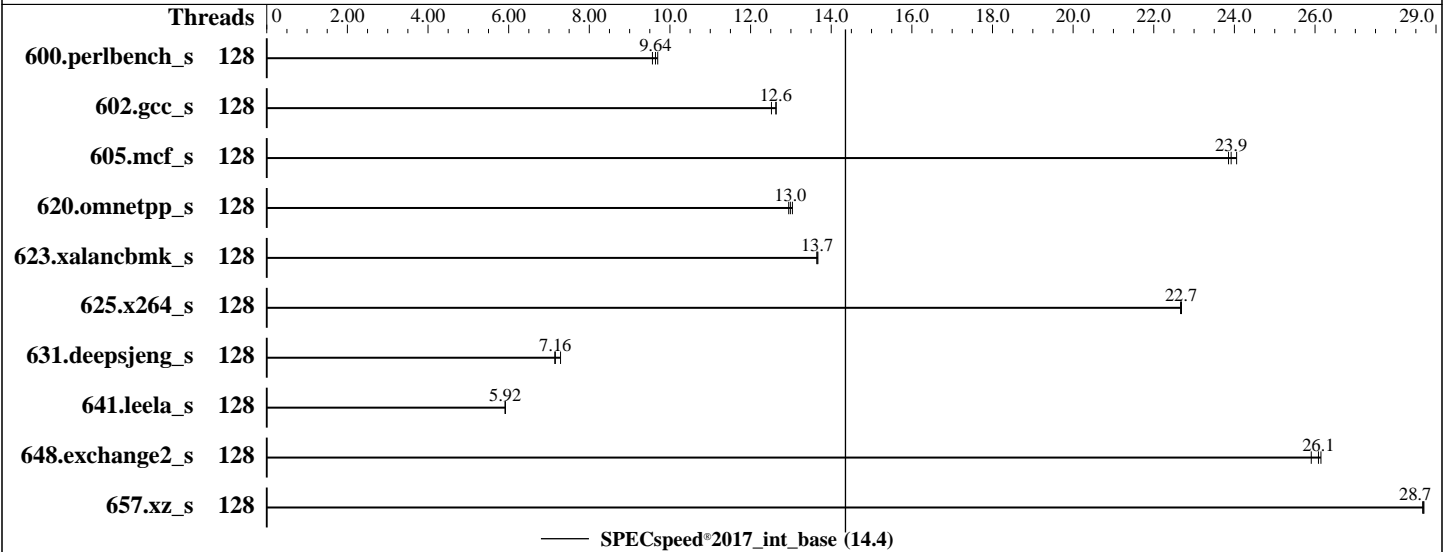
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2024

Hardware Availability: Mar-2024

Software Availability: Dec-2023



Hardware

CPU Name: Intel Xeon Platinum 8592+
 Max MHz: 3900
 Nominal: 1900
 Enabled: 64 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: 320 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (8 x 64 GB 2Rx4 PC5-5600B-R)
 Storage: 1 x 960 GB M.2 NVMe SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP5
 Kernel 5.14.21-150500.53-default
 Compiler: 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;
 Parallel: Yes
 Firmware: Lenovo BIOS Version FNE113F 2.20 released Jan-2024
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: jemalloc memory allocator V5.0.1
 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 | | | | | | |
|-----------------|---------|-------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------|---------|-------|---------|-------|---------|-------|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 600.perlbench_s | 128 | 183 | 9.70 | <u>184</u> | <u>9.64</u> | 186 | 9.57 | | | | | | | |
| 602.gcc_s | 128 | 315 | 12.6 | <u>315</u> | <u>12.6</u> | 318 | 12.5 | | | | | | | |
| 605.mcf_s | 128 | <u>197</u> | <u>23.9</u> | 198 | 23.9 | 196 | 24.1 | | | | | | | |
| 620.omnetpp_s | 128 | 126 | 12.9 | 125 | 13.0 | <u>126</u> | <u>13.0</u> | | | | | | | |
| 623.xalancbmk_s | 128 | <u>104</u> | <u>13.7</u> | 104 | 13.7 | 104 | 13.6 | | | | | | | |
| 625.x264_s | 128 | 77.8 | 22.7 | <u>77.8</u> | <u>22.7</u> | 77.8 | 22.7 | | | | | | | |
| 631.deepsjeng_s | 128 | <u>200</u> | <u>7.16</u> | 201 | 7.14 | 197 | 7.29 | | | | | | | |
| 641.leela_s | 128 | <u>288</u> | <u>5.92</u> | 288 | 5.92 | 288 | 5.92 | | | | | | | |
| 648.exchange2_s | 128 | <u>113</u> | <u>26.1</u> | 113 | 25.9 | 112 | 26.1 | | | | | | | |
| 657.xz_s | 128 | <u>215</u> | <u>28.7</u> | 215 | 28.7 | 216 | 28.7 | | | | | | | |

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

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:

KMP_AFFINITY = "granularity=fine,scatter"

LD_LIBRARY_PATH =

"/home/cpu2017-1.1.9-ic2023.2.3/lib/intel164:/home/cpu2017-1.1.9-ic2023.2.3/lib/ia32:/home/cpu2017-1.1.9-ic2023.2.3/je5.0.1-64"

MALLOC_CONF = "retain:true"

OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM

memory using Redhat Enterprise Linux 8.0

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
```

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

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode

C-States set to Legacy

SNC set to SNC2

Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Mon Jan 8 11:18:25 2024

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

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1. uname -a
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10. who -r
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
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14. cpupower frequency-info
15. sysctl
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17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
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20. /sys/devices/virtual/dmi/id
21. dmidecode
22. 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
11:18:25 up 2 min, 1 user, load average: 0.05, 0.06, 0.02
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 11:16 9.00s 0.79s 0.00s -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
file size (blocks, -f) unlimited
pending signals (-i) 2062498
```

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Platform Notes (Continued)

```

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) 2062498
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
-bash
-bash
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2023.2.3-lin-sapphirerapids-speed-20231121.cfg --define cores=64 --tune base -o all --define
  intspeedaffinity --define smt-on --define drop_caches intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2023.2.3-lin-sapphirerapids-speed-20231121.cfg --define cores=64 --tune base --output_format all
  --define intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base
  --size refspeed intspeed --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.331/temlogs/preenv.intspeed.331.0.log --lognum 331.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.2.3

```

6. /proc/cpuinfo

```

model name      : INTEL(R) XEON(R) PLATINUM 8592+
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     : 64
siblings      : 128
1 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-63
physical id 0: apicids 0-127

```

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
Model name:        INTEL(R) XEON(R) PLATINUM 8592+

```

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Platform Notes (Continued)

```

CPU family:          6
Model:              207
Thread(s) per core: 2
Core(s) per socket: 64
Socket(s):          1
Stepping:           2
BogoMIPS:           3800.00
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
                   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:          3 MiB (64 instances)
L1i cache:          2 MiB (64 instances)
L2 cache:           128 MiB (64 instances)
L3 cache:           320 MiB (1 instance)
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 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; userscopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSE-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 | 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 | 320M | 320M | 20 | Unified | 3 | 262144 | 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: 257661 MB
node 0 free: 256725 MB
node 1 cpus: 32-63,96-127

```

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Platform Notes (Continued)

```
node 1 size: 257993 MB
node 1 free: 257202 MB
node distances:
node  0  1
  0: 10 12
  1: 12 10
```

```
-----
9. /proc/meminfo
   MemTotal:          528030176 kB
```

```
-----
10. who -r
    run-level 3 Jan 8 11:16
```

```
-----
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 auditd cron getty@ irqbalance issue-generator
                    kbdsettings klog lvm2-monitor nscd nvme-fc-boot-connections postfix purge-kernels rollback
                    rsyslog smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6
                    wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled       autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                    chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
                    firewallld gpm grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys
                    kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nvme-autoconnect rpcbind
                    rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd
                    systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                    systemd-time-wait-sync systemd-timesyncd
    indirect       wickedd
```

```
-----
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
    root=UUID=f243a704-c613-4a2e-b642-e5754787f2a2
    splash=silent
    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. sysctl
    kernel.numa_balancing          1
    kernel.randomize_va_space     2
    vm.compaction_proactiveness    20
    vm.dirty_background_bytes      0
```

(Continued on next page)



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Platform Notes (Continued)

```

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                   60
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode           0

```

```

-----
16. /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

```

```

-----
17. /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

```

```

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

```

```

-----
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs   893G   29G  864G   4% /

```

```

-----
20. /sys/devices/virtual/dmi/id
Vendor:      Lenovo
Product:     ThinkSystem SD530 V3
Product Family: ThinkSystem
Serial:      PASDVMMK006

```

```

-----
21. 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:
  3x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600
  5x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600

```

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Platform Notes (Continued)

22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: FNE113F-2.20
BIOS Date: 01/02/2024
BIOS Revision: 2.20
Firmware Revision: 1.10

Compiler Version Notes

=====
C | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

=====
C++ | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

=====
Fortran | 648.exchange2_s(base)
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64

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Base Portability Flags (Continued)

```
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -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 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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/jemalloc64-5.0.1/lib -ljemalloc
```

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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.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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