



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR630 V3
(2.10 GHz, Intel Xeon Gold 6430)

SPECrate®2017_int_base = 509

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017

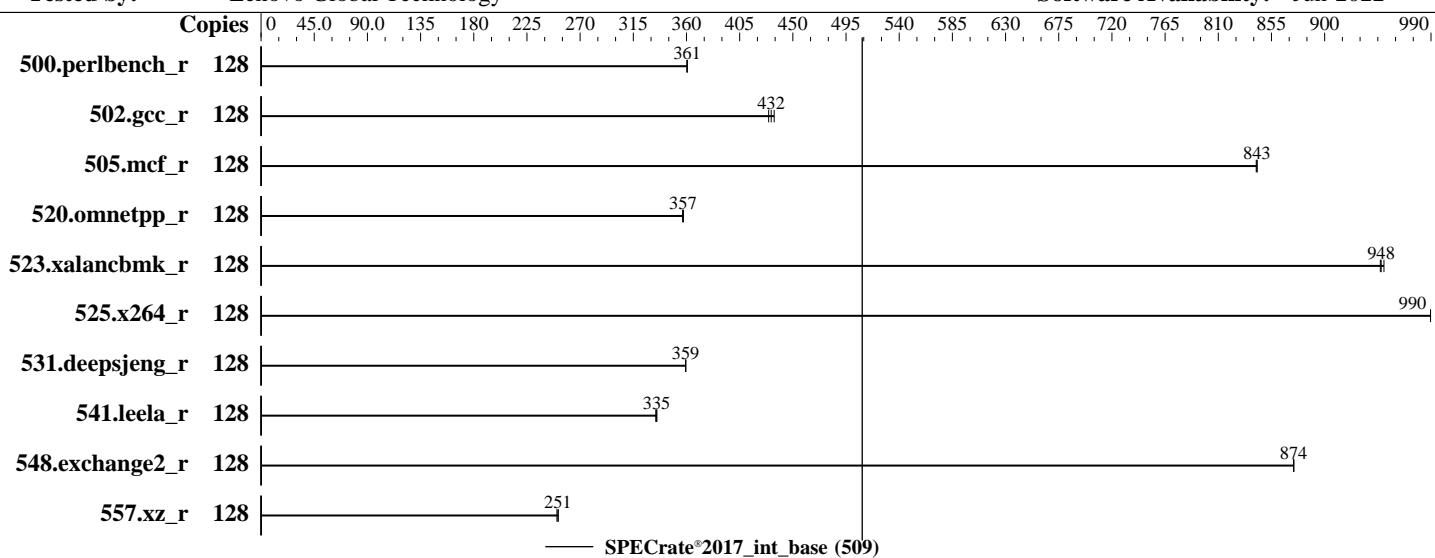
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2023

Hardware Availability: Feb-2023

Software Availability: Jun-2022



Hardware

CPU Name: Intel Xeon Gold 6430
Max MHz: 3400
Nominal: 2100
Enabled: 64 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: 60 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)
Storage: 1 x 960 GB SATA SSD
Other: None

OS:

SUSE Linux Enterprise Server 15 SP4 (x86_64)

Kernel 5.14.21-150400.22-default

C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;

No

Lenovo BIOS Version ESE109L 1.10 released Jan-2023

xfs

Run level 3 (multi-user)

64-bit

Not Applicable

None

BIOS and OS set to prefer performance at the cost of additional power usage

Software



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Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	565	361	565	360	565	361									
502.gcc_r	128	417	434	422	430	420	432									
505.mcf_r	128	245	843	246	842	245	843									
520.omnetpp_r	128	470	357	471	357	470	357									
523.xalancbmk_r	128	143	948	143	947	142	950									
525.x264_r	128	226	990	226	990	226	990									
531.deepsjeng_r	128	408	359	408	359	408	359									
541.leela_r	128	635	334	633	335	633	335									
548.exchange2_r	128	384	874	384	874	384	874									
557.xz_r	128	550	251	550	251	552	250									

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
  "/home/cpu2017-1.1.9-ic2022.1/lib/intel64:/home/cpu2017-1.1.9-ic2022.1/lib/ia32:/home/cpu2017-1.1.9-ic
  2022.1/je5.0.1-32"
MALLOC_CONF = "retain:true"
```



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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.

Platform Notes

BIOS configuration:

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

SNC set to SNC4

LLC Prefetch set to Disabled

UPI Link Disable set to Disabled 1 Link

C-state set to Legacy

```
Sysinfo program /home/cpu2017-1.1.9-ic2022.1/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on test1 Fri Feb  3 21:55:24 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. numactl --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. sysctl
- 16. /sys/kernel/mm/transparent_hugepage
- 17. /sys/kernel/mm/transparent_hugepage/khugepaged
- 18. OS release
- 19. Disk information
- 20. /sys/devices/virtual/dmi/id
- 21. dmidecode
- 22. BIOS

- 1. uname -a

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Platform Notes (Continued)

```
Linux test1 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  
 21:55:24 up 3:34, 1 user, load average: 72.22, 113.43, 122.18  
USER   TTY      FROM          LOGIN@    IDLE   JCPU   PCPU WHAT  
root   tty1     -           18:22     3:31m  0.97s  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) 2062486  
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                (-t) unlimited  
max user processes      (-u) 2062486  
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  
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c  
  ic2022.1-lin-core-avx2-rate-20220316.cfg --define smt-on --define cores=64 --define physicalfirst --define  
  invoke_with_interleave --define drop_caches --tune base -o all intrate  
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile  
  ic2022.1-lin-core-avx2-rate-20220316.cfg --define smt-on --define cores=64 --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/CPU2017.035/templogs/preenv.intrate.035.0.log --lognum 035.0 --from_runcpu 2  
specperl $SPEC/bin/sysinfo  
$SPEC = /home/cpu2017-1.1.9-ic2022.1
```

```
-----  
6. /proc/cpuinfo  
model name          : Intel(R) Xeon(R) Gold 6430  
vendor_id           : GenuineIntel  
cpu family          : 6  
model               : 143  
stepping             : 8  
microcode           : 0x2b000161  
bugs                : spectre_v1 spectre_v2 spec_store_bypass swapgs  
cpu cores            : 32  
siblings             : 64
```

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Platform Notes (Continued)

```
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: apicids 0-63
physical id 1: apicids 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 2.37.2:

```
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) Gold 6430
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
Stepping: 8
BogoMIPS: 4200.00
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 aperf mperf tsc_known_freq pni pclmulqdq dtes64 monitor
      ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1
      sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
     lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 cat_12 cdp_13
      invpcid_single intel_ppin cdp_12 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 xsavec xgetbv1 xsave xqm_llc xqm_occup_llc xqm_mbm_total
      xqm_mbm_local split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida
      arat pln pts avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes
      vpcimulqdq avx512_vnni avx512_bitalg tme avx512_vpocntdq 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
      VT-x
Virtualization:
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): 8
NUMA node0 CPU(s): 0-7,64-71
NUMA node1 CPU(s): 8-15,72-79
NUMA node2 CPU(s): 16-23,80-87
NUMA node3 CPU(s): 24-31,88-95
NUMA node4 CPU(s): 32-39,96-103
NUMA node5 CPU(s): 40-47,104-111
NUMA node6 CPU(s): 48-55,112-119
NUMA node7 CPU(s): 56-63,120-127
Vulnerability Itlb multihit: Not affected
```

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Platform Notes (Continued)

Vulnerability Llftf:	Not affected
Vulnerability Mds:	Not affected
Vulnerability Meltdown:	Not affected
Vulnerability Spec 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 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	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: 8 nodes (0-7)

node 0 cpus: 0-7,64-71

node 0 size: 64137 MB

node 0 free: 63144 MB

node 1 cpus: 8-15,72-79

node 1 size: 64507 MB

node 1 free: 63893 MB

node 2 cpus: 16-23,80-87

node 2 size: 64507 MB

node 2 free: 63876 MB

node 3 cpus: 24-31,88-95

node 3 size: 64507 MB

node 3 free: 63902 MB

node 4 cpus: 32-39,96-103

node 4 size: 64507 MB

node 4 free: 63909 MB

node 5 cpus: 40-47,104-111

node 5 size: 64507 MB

node 5 free: 63920 MB

node 6 cpus: 48-55,112-119

node 6 size: 64507 MB

node 6 free: 63928 MB

node 7 cpus: 56-63,120-127

node 7 size: 64461 MB

node 7 free: 63865 MB

node distances:

node 0	1	2	3	4	5	6	7
0:	10	12	12	21	21	21	21
1:	12	10	12	12	21	21	21
2:	12	12	10	12	21	21	21
3:	12	12	12	10	21	21	21
4:	21	21	21	21	10	12	12
5:	21	21	21	21	12	10	12
6:	21	21	21	21	12	12	10
7:	21	21	21	21	12	12	10

9. /proc/meminfo

MemTotal: 528020888 kB

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Platform Notes (Continued)

10. who -r
run-level 3 Feb 3 18:21

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
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@ haveged irqbalance iscsi
issue-generator kbdsettings klog lvm2-monitor nsqd postfix purge-kernels rollback rsyslog
smartd sshd 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
firewalld gpm grub2-once haveged-switch-root ipmi ipmievdi iscsi-init iscsid iscsiuio
issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb rdisc
rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd
systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd
generated ntp_sync
indirect wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=f976c541-a329-4c54-ba84-4be16556ee18
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
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

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Platform Notes (Continued)

```
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+madvise [madvise] never
    enabled          [always] madvise 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 SP4

-----
19. Disk information
    SPEC is set to: /home/cpu2017-1.1.9-ic2022.1
    Filesystem  Type  Size  Used Avail Use% Mounted on
    /dev/sdb2    xfs   894G   69G  825G   8% /

-----
20. /sys/devices/virtual/dmi/id
    Vendor:        Lenovo
    Product:       ThinkSystem SR630 V3
    Product Family: ThinkSystem
    Serial:        1234567890

-----
21. dmidecode
    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:
        1x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800, configured at 4400
        5x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800, configured at 4400
        10x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800, configured at 4400

-----
22. BIOS
    (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:        Lenovo
    BIOS Version:       ESE109L-1.10
    BIOS Date:          01/07/2023
    BIOS Revision:      1.10
    Firmware Revision: 1.0
```



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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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-----

=====
Fortran | 548.exchange2_r(base)
-----
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
```

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
```



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Base Optimization Flags

C benchmarks:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -fno-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc
```

C++ benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -fno-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -fno-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc
```

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-N.html>
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.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-N.xml>
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.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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