SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017\_int\_base = 1750$

ThinkSystem SR645 V3
(3.15 GHz, AMD EPYC 9565)

$SPECrate^{®}2017\_int\_peak = 1790$

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Jan-2025
Hardware Availability: Feb-2025
Software Availability: Oct-2024

	Copies	Result
500.perlbench_r	288	1210
502.gcc_r	288	1260 / 1560
505.mcf_r	288	2500 / 2520
520.omnetpp_r	288	797
523.xalancbmk_r	288	3070
525.x264_r	288	4320
531.deepsjeng_r	288	1450
541.leela_r	288	1300
548.exchange2_r	288	4320
557.xz_r	288	802 / 805

SPECrate®2017_int_base (1750)   SPECrate®2017_int_peak (1790)

Hardware

CPU Name: AMD EPYC 9565
 Max MHz: 4300
 Nominal: 3150
Enabled: 144 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 384 MB I+D on chip per chip,
 32 MB shared / 6 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx8 PC5-6400B-R, running at 6000)
Storage: 1 x 480 GB SATA SSD
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP6
 Kernel 6.4.0-150600.21-default
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
Parallel: No
Firmware: Lenovo BIOS Version KAE131I 5.30 released Dec-2024
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

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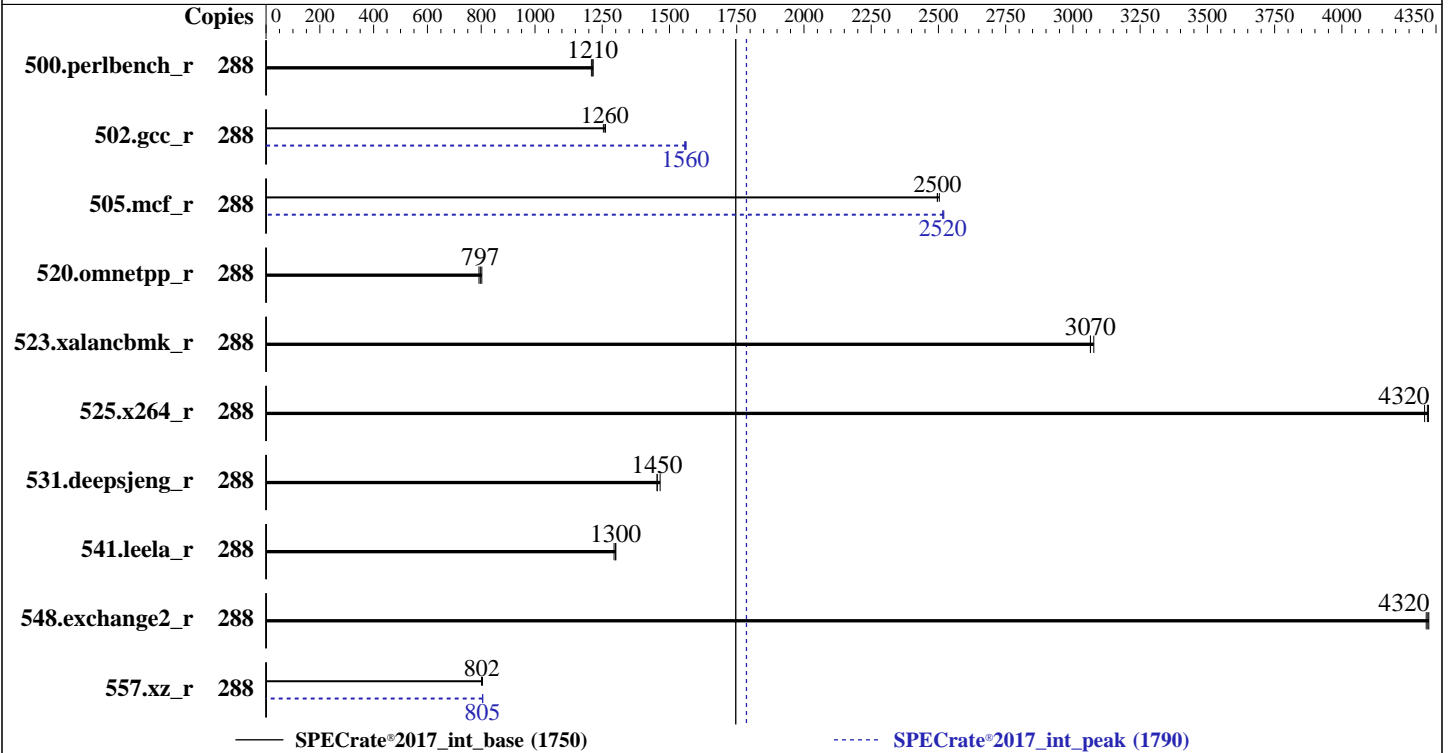
SPECrate®2017_int_peak = 1790

CPU2017 License: 9017	**Test Date:** Jan-2025
Test Sponsor: Lenovo Global Technology	**Hardware Availability:** Feb-2025
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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	288	377	1220	**377**	**1210**	379	1210	288	377	1220	**377**	**1210**	379	1210
502.gcc_r	288	323	1260	325	1250	**324**	**1260**	288	**262**	**1560**	262	1560	261	1560
505.mcf_r	288	186	2500	186	2500	**186**	**2500**	288	185	2520	**185**	**2520**	185	2520
520.omnetpp_r	288	477	792	**474**	**797**	471	802	288	477	792	**474**	**797**	471	802
523.xalancbmk_r	288	98.8	3080	**99.2**	**3070**	99.2	3070	288	98.8	3080	**99.2**	**3070**	99.2	3070
525.x264_r	288	**117**	**4320**	117	4310	117	4320	288	**117**	**4320**	117	4310	117	4320
531.deepsjeng_r	288	227	1450	225	1470	**227**	**1450**	288	227	1450	225	1470	**227**	**1450**
541.leela_r	288	367	1300	**367**	**1300**	369	1290	288	367	1300	**367**	**1300**	369	1290
548.exchange2_r	288	175	4310	**175**	**4320**	175	4320	288	175	4310	**175**	**4320**	175	4320
557.xz_r	288	**388**	**802**	387	805	388	802	288	386	805	**386**	**805**	386	806
SPECrate®2017_int_base =	**1750**													
SPECrate®2017_int_peak =	**1790**													

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

Compiler Notes

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

cpupower set to performance mode
cpupower frequency-set -r -g performance
To enable Transparent Hugepages (THP) for all allocations:
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017-1.1.9-amd
     -aocc500_znver5_A1.2/amd_rate_aocc500_znver5_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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
P-State set to Enabled
NUMA Nodes per Socket set to NPS4
ACPI SRAT L3 Cache as NUMA Domain set to Enabled

 Sysinfo program /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Fri Jan 17 14:59:55 2025

 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 254 (254.10+suse.84.ge8d77af424)
 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
```

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Platform Notes (Continued)

```
   23. BIOS
  ------------------------------------------------------------

  ------------------------------------------------------------
  1. uname -a
    Linux localhost 6.4.0-150600.21-default #1 SMP PREEMPT_DYNAMIC Thu May 16 11:09:22 UTC 2024 (36c1e09)
    x86_64 x86_64 x86_64 GNU/Linux

  ------------------------------------------------------------
  2. w
     14:59:55 up 4 min,  1 user,  load average: 0.23, 0.57, 0.31
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT

  ------------------------------------------------------------
  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) 3093467
    max locked memory       (kbytes, -l) 2097152
    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) 3093467
    virtual memory          (kbytes, -v) unlimited
    file locks                      (-x) unlimited

  ------------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize=42
   sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root [priv]
   sshd: root@notty
   /bin/bash ./02.remote_local_SPECcpu_1.01.sh
   /bin/bash ./Run025-compliant-amd-rateint.sh
   python3 ./run_amd_rate_aocc500_znver5_A1.py
   /bin/bash ./amd_rate_aocc500_znver5_A1.sh
   runcpu --config amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 intrate
   runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
     --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.177/templogs/preenv.intrate.177.0.log --lognum 177.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
  $SPEC = /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2

  ------------------------------------------------------------
  6. /proc/cpuinfo
      model name      : AMD EPYC 9565 72-Core Processor
      vendor_id       : AuthenticAMD
      cpu family      : 26
      model           : 2
      stepping        : 1
```

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Platform Notes (Continued)

```
     microcode       : 0xb00211a
     bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
     TLB size        : 192 4K pages
     cpu cores       : 72
     siblings        : 144
     2 physical ids (chips)
     288 processors (hardware threads)
     physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61,64-69,72-77,80-85,88-93
     physical id 1: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61,64-69,72-77,80-85,88-93
     physical id 0: apicids 0-11,16-27,32-43,48-59,64-75,80-91,96-107,112-123,128-139,144-155,160-171,176-187
     physical id 1: apicids
     256-267,272-283,288-299,304-315,320-331,336-347,352-363,368-379,384-395,400-411,416-427,432-443
  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 2.39.3:
    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):                     288
    On-line CPU(s) list:        0-287
    Vendor ID:                  AuthenticAMD
    BIOS Vendor ID:             Advanced Micro Devices, Inc.
    Model name:                 AMD EPYC 9565 72-Core Processor
    BIOS Model name:            AMD EPYC 9565 72-Core Processor              Unknown CPU @ 3.1GHz
    BIOS CPU family:            107
    CPU family:                 26
    Model:                      2
    Thread(s) per core:         2
    Core(s) per socket:         72
    Socket(s):                  2
    Stepping:                   1
    Frequency boost:            enabled
    CPU(s) scaling MHz:         100%
    CPU max MHz:                3150.0000
    CPU min MHz:                1500.0000
    BogoMIPS:                   6290.41
    Flags:                      fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
                                pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb
                                rdtscp lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid
                                extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid
                                sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm
                                cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
                                osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
                                perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
                                ibrs ibpb stibp ibrs_enhanced vmmcall fsgsbase tsc_adjust bmi1 avx2
                                smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
                                avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
                                xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                                cqm_mbm_local user_shstk avx_vnni avx512_bf16 clzero irperf
                                xsaveerptr rdpru wbnoinvd amd_ppin cppc arat npt lbrv svm_lock
                                nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
                                pfthreshold avic v_vmsave_vmload vgif x2avic v_spec_ctrl vnmi
                                avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
                                avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid bus_lock_detect
                                movdiri movdir64b overflow_recov succor smca fsrm avx512_vp2intersect
```

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Platform Notes (Continued)

```
                              flush_l1d debug_swap
  Virtualization:             AMD-V
  L1d cache:                  6.8 MiB (144 instances)
  L1i cache:                  4.5 MiB (144 instances)
  L2 cache:                   144 MiB (144 instances)
  L3 cache:                   768 MiB (24 instances)
  NUMA node(s):               24
  NUMA node0 CPU(s):          0-5,144-149
  NUMA node1 CPU(s):          6-11,150-155
  NUMA node2 CPU(s):          12-17,156-161
  NUMA node3 CPU(s):          18-23,162-167
  NUMA node4 CPU(s):          24-29,168-173
  NUMA node5 CPU(s):          30-35,174-179
  NUMA node6 CPU(s):          36-41,180-185
  NUMA node7 CPU(s):          42-47,186-191
  NUMA node8 CPU(s):          48-53,192-197
  NUMA node9 CPU(s):          54-59,198-203
  NUMA node10 CPU(s):         60-65,204-209
  NUMA node11 CPU(s):         66-71,210-215
  NUMA node12 CPU(s):         72-77,216-221
  NUMA node13 CPU(s):         78-83,222-227
  NUMA node14 CPU(s):         84-89,228-233
  NUMA node15 CPU(s):         90-95,234-239
  NUMA node16 CPU(s):         96-101,240-245
  NUMA node17 CPU(s):         102-107,246-251
  NUMA node18 CPU(s):         108-113,252-257
  NUMA node19 CPU(s):         114-119,258-263
  NUMA node20 CPU(s):         120-125,264-269
  NUMA node21 CPU(s):         126-131,270-275
  NUMA node22 CPU(s):         132-137,276-281
  NUMA node23 CPU(s):         138-143,282-287
  Vulnerability Gather data sampling:  Not affected
  Vulnerability Itlb multihit:         Not affected
  Vulnerability L1tf:                  Not affected
  Vulnerability Mds:                   Not affected
  Vulnerability Meltdown:              Not affected
  Vulnerability Mmio stale data:       Not affected
  Vulnerability Reg file data sampling: Not affected
  Vulnerability Retbleed:              Not affected
  Vulnerability Spec rstack overflow:  Not affected
  Vulnerability Spec store bypass:     Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:            Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:            Mitigation; Enhanced / Automatic IBRS; IBPB conditional; STIBP
                                       always-on; RSB filling; PBRSB-eIBRS Not affected; BHI Not affected
  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     6.8M   12 Data          1    64       1            64
      L1i      32K     4.5M    8 Instruction   1    64       1            64
      L2        1M     144M   16 Unified       2  1024       1            64
      L3       32M     768M   16 Unified       3 32768       1            64

  ------------------------------------------------------------
8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 24 nodes (0-23)
   node 0 cpus: 0-5,144-149
   node 0 size: 31764 MB
```

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Platform Notes (Continued)

```
    node 0 free: 31494 MB
    node 1 cpus: 6-11,150-155
    node 1 size: 32252 MB
    node 1 free: 32021 MB
    node 2 cpus: 12-17,156-161
    node 2 size: 32252 MB
    node 2 free: 32023 MB
    node 3 cpus: 18-23,162-167
    node 3 size: 32252 MB
    node 3 free: 31961 MB
    node 4 cpus: 24-29,168-173
    node 4 size: 32252 MB
    node 4 free: 31971 MB
    node 5 cpus: 30-35,174-179
    node 5 size: 32214 MB
    node 5 free: 31962 MB
    node 6 cpus: 36-41,180-185
    node 6 size: 32252 MB
    node 6 free: 31750 MB
    node 7 cpus: 42-47,186-191
    node 7 size: 32252 MB
    node 7 free: 32022 MB
    node 8 cpus: 48-53,192-197
    node 8 size: 32252 MB
    node 8 free: 32041 MB
    node 9 cpus: 54-59,198-203
    node 9 size: 32252 MB
    node 9 free: 31957 MB
    node 10 cpus: 60-65,204-209
    node 10 size: 32252 MB
    node 10 free: 32009 MB
    node 11 cpus: 66-71,210-215
    node 11 size: 32252 MB
    node 11 free: 32009 MB
    node 12 cpus: 72-77,216-221
    node 12 size: 32252 MB
    node 12 free: 32030 MB
    node 13 cpus: 78-83,222-227
    node 13 size: 32252 MB
    node 13 free: 32035 MB
    node 14 cpus: 84-89,228-233
    node 14 size: 32252 MB
    node 14 free: 32049 MB
    node 15 cpus: 90-95,234-239
    node 15 size: 32252 MB
    node 15 free: 32005 MB
    node 16 cpus: 96-101,240-245
    node 16 size: 32252 MB
    node 16 free: 32020 MB
    node 17 cpus: 102-107,246-251
    node 17 size: 32252 MB
    node 17 free: 31978 MB
    node 18 cpus: 108-113,252-257
    node 18 size: 32252 MB
    node 18 free: 32010 MB
    node 19 cpus: 114-119,258-263
    node 19 size: 32252 MB
    node 19 free: 32042 MB
    node 20 cpus: 120-125,264-269
    node 20 size: 32252 MB
```

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Platform Notes (Continued)

```
   node 20 free: 32028 MB
   node 21 cpus: 126-131,270-275
   node 21 size: 32252 MB
   node 21 free: 31827 MB
   node 22 cpus: 132-137,276-281
   node 22 size: 32252 MB
   node 22 free: 31953 MB
   node 23 cpus: 138-143,282-287
   node 23 size: 32107 MB
   node 23 free: 31806 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23
     0:  10  11  11  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     1:  11  10  11  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     2:  11  11  10  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     3:  12  12  12  10  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     4:  12  12  12  11  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     5:  12  12  12  11  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     6:  12  12  12  12  12  12  10  11  11  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     7:  12  12  12  12  12  12  11  10  11  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     8:  12  12  12  12  12  12  11  11  10  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
     9:  12  12  12  12  12  12  12  12  12  10  11  11  32  32  32  32  32  32  32  32  32  32  32  32
    10:  12  12  12  12  12  12  12  12  12  11  10  11  32  32  32  32  32  32  32  32  32  32  32  32
    11:  12  12  12  12  12  12  12  12  12  11  11  10  32  32  32  32  32  32  32  32  32  32  32  32
    12:  32  32  32  32  32  32  32  32  32  32  32  32  10  11  11  12  12  12  12  12  12  12  12  12
    13:  32  32  32  32  32  32  32  32  32  32  32  32  11  10  11  12  12  12  12  12  12  12  12  12
    14:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  10  12  12  12  12  12  12  12  12  12
    15:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  10  11  11  12  12  12  12  12  12
    16:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  10  11  12  12  12  12  12  12
    17:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  11  10  12  12  12  12  12  12
    18:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11  11  12  12  12
    19:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10  11  12  12  12
    20:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11  10  12  12  12
    21:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  10  11  11
    22:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  11  10  11
    23:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  11  11  10


   ------------------------------------------------------------
   9. /proc/meminfo
     MemTotal:       791954764 kB


   ------------------------------------------------------------
   10. who -r
     run-level 3 Jan 17 14:56


   ------------------------------------------------------------
   11. Systemd service manager version: systemd 254 (254.10+suse.84.ge8d77af424)
     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 postfix purge-kernels rollback rsyslog sapconf smartd
                     sshd sysctl-logger systemd-pstore tuned 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 ebtables exchange-bmc-os-info
```

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Platform Notes (Continued)

```
                   firewalld fsidd gpm grub2-once haveged hwloc-dump-hwdata ipmi ipmievd issue-add-ssh-keys
                   kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd
                   serial-getty@ smartd_generate_opts snmpd snmptrapd sysstat systemd-boot-check-no-failures
                   systemd-confext systemd-network-generator systemd-sysext systemd-time-wait-sync
                   systemd-timesyncd
     generated     ntp_sync
     indirect      systemd-userdbd uuidd wickedd


  -------------------------------------------------------------
  13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.21-default
    root=UUID=36ce2ea9-ca92-4f5a-b22a-9bea62fad028
    splash=silent
    mitigations=auto
    quiet
    security=apparmor


  -------------------------------------------------------------
  14. cpupower frequency-info
    analyzing CPU 135:
      current policy: frequency should be within 1.50 GHz and 3.15 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: virtual-host


  -------------------------------------------------------------
  16. sysctl
    kernel.numa_balancing              1
    kernel.randomize_va_space          0
    vm.compaction_proactiveness       20
    vm.dirty_background_bytes          0
    vm.dirty_background_ratio          5
    vm.dirty_bytes                     0
    vm.dirty_expire_centisecs       3000
    vm.dirty_ratio                     8
    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                      1
    vm.watermark_boost_factor      15000
    vm.watermark_scale_factor         10
    vm.zone_reclaim_mode               1


  -------------------------------------------------------------
  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
```

(Continued on next page)

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Platform Notes (Continued)

```
----------------------------------------------------------
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 SP6


----------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2
  Filesystem      Type  Size  Used Avail Use% Mounted on
  /dev/sda3       xfs   442G  109G  334G  25% /


----------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SR645 V3
    Product Family: ThinkSystem
    Serial:         1234567890


----------------------------------------------------------
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:
    12x SK Hynix HMCG88AHBRA471N 32 GB 2 rank 6400, configured at 6000
    2x SK Hynix HMCG88AHBRA472N 32 GB 2 rank 6400, configured at 6000
    10x SK Hynix HMCG88AHBRA478N 32 GB 2 rank 6400, configured at 6000



----------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:      Lenovo
    BIOS Version:     KAE131I-5.30
    BIOS Date:        12/17/2024
    BIOS Revision:    5.30
    Firmware Revision: 54.6
```

Compiler Version Notes

```
==================================================================================================
C     | 502.gcc_r(peak)
--------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================
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)
------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------


==============================================================================
C        | 502.gcc_r(peak)
------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------


==============================================================================
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)
------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------


==============================================================================
C++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
         | 541.leela_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

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Base Compiler Invocation (Continued)

Fortran benchmarks:
```
flang
```

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
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:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-Wl,-mllvm -Wl,-extra-inliner -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdalloc-ext -ldl
```

C++ benchmarks:
```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=advanced -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -fno-PIE -no-pie
-fvirtual-function-elimination -fvisibility=hidden
-mllvm -do-block-reorder=advanced -lamdlibm -lflang -lamdalloc-ext
-ldl
```

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Base Optimization Flags (Continued)

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto
-fepilog-vectorization-of-inductions -mllvm -optimize-strided-mem-cost
-floop-transform -mllvm -unroll-aggressive -mllvm -unroll-threshold=500
-lamdlibm -lflang -lamdalloc -ldl
```

Base Other Flags

C benchmarks:
```
-Wno-unused-command-line-argument
```

C++ benchmarks:
```
-Wno-unused-command-line-argument
```

Fortran benchmarks:
```
-Wno-unused-command-line-argument
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

Peak Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
```

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Peak Portability Flags (Continued)

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: basepeak = yes

502.gcc_r: `-m32 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand`
`-fenable-aggressive-gather -Wl,-mllvm -Wl,-extra-inliner`
`-z muldefs -Ofast -march=znver5 -fveclib=AMDLIBM`
`-ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -fgnu89-inline`
`-lamdalloc`

505.mcf_r: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-extra-inliner -Ofast -march=znver5`
`-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -lamdlibm`
`-lflang -lamdalloc-ext -ldl`

525.x264_r: basepeak = yes

557.xz_r: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-ldist-scalar-expand`
`-fenable-aggressive-gather -Wl,-mllvm -Wl,-extra-inliner`
`-Ofast -march=znver5 -fveclib=AMDLIBM -ffast-math -flto`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -lamdlibm`
`-lflang -lamdalloc-ext -ldl`

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CPU2017 License: 9017		**Test Date:**	Jan-2025
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Feb-2025
Tested by:	Lenovo Global Technology	**Software Availability:**	Oct-2024

Peak Optimization Flags (Continued)

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`

Peak Other Flags

C benchmarks (except as noted below):
`-Wno-unused-command-line-argument`

502.gcc_r: `-L/usr/lib32 -Wno-unused-command-line-argument`
`-L/home/work/cpu2017/v119/aocc5/1316/amd_rate_aocc500_znver5_A_lib/lib32`

C++ benchmarks:
`-Wno-unused-command-line-argument`

Fortran benchmarks:
`-Wno-unused-command-line-argument`

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-Turin-E.html
http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.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-Turin-E.xml
http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.xml

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

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