SPEC CPU®2017 Integer Rate Result

Copyright 2017-2025 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR645 V3
(2.20 GHz, AMD EPYC 9825)

$SPECrate^{®}2017\_int\_base = 2460$

$SPECrate^{®}2017\_int\_peak = 2530$
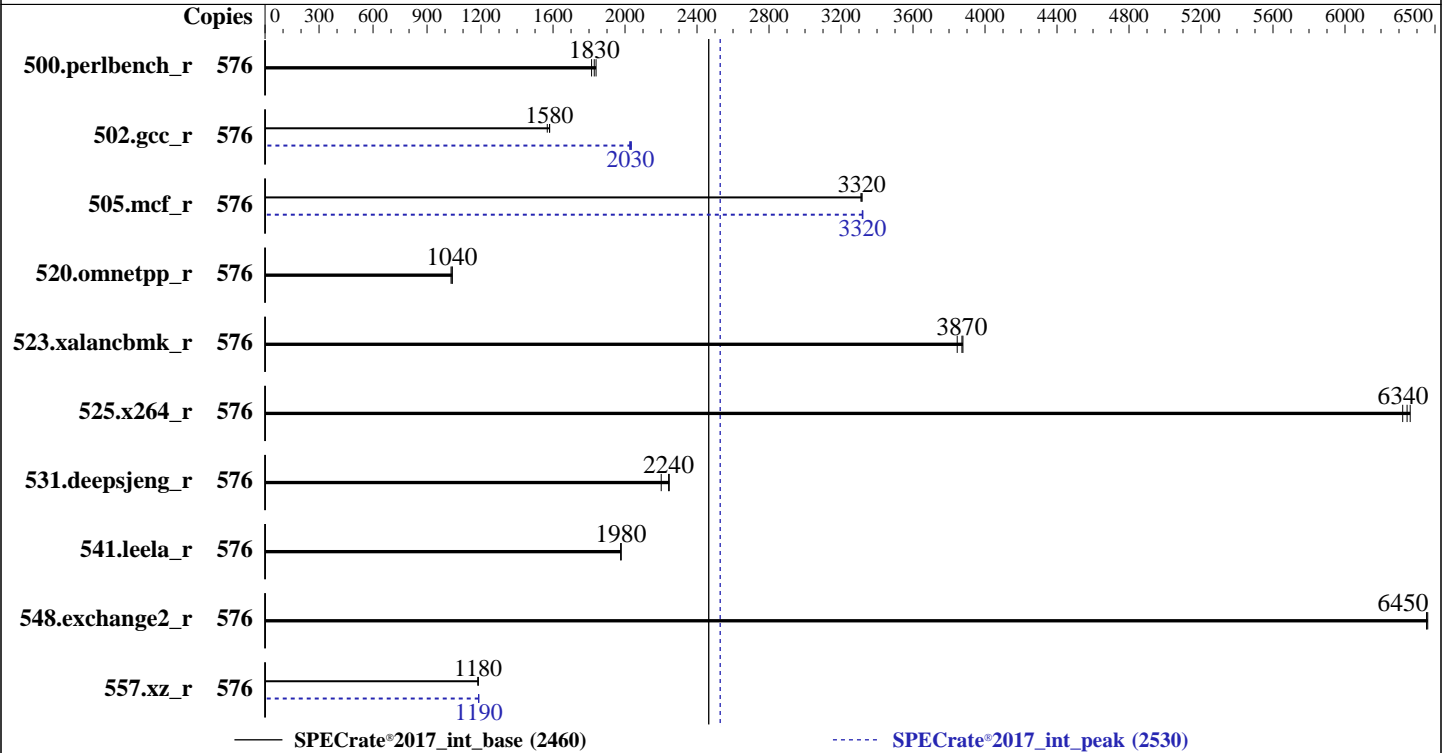
CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Benchmark	Copies	Base	Peak
500.perlbench_r	576	1830	
502.gcc_r	576	1580	2030
505.mcf_r	576	3320	3320
520.omnetpp_r	576	1040	
523.xalancbmk_r	576	3870	
525.x264_r	576	6340	
531.deepsjeng_r	576	2240	
541.leela_r	576	1980	
548.exchange2_r	576	6450	
557.xz_r	576	1180	1190

SPECrate®2017_int_base (2460)   SPECrate®2017_int_peak (2530)

Hardware

CPU Name: AMD EPYC 9825
 Max MHz: 3700
 Nominal: 2200
Enabled: 288 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 / 12 cores
 Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 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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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	576	499	1840	**501**	**1830**	505	1810	576	499	1840	**501**	**1830**	505	1810
502.gcc_r	576	516	1580	520	1570	**516**	**1580**	576	**402**	**2030**	403	2030	401	2040
505.mcf_r	576	**281**	**3320**	281	3320	281	3310	576	281	3320	**280**	**3320**	280	3320
520.omnetpp_r	576	731	1030	727	1040	**727**	**1040**	576	731	1030	727	1040	**727**	**1040**
523.xalancbmk_r	576	**157**	**3870**	158	3850	157	3880	576	**157**	**3870**	158	3850	157	3880
525.x264_r	576	**159**	**6340**	159	6360	160	6320	576	**159**	**6340**	159	6360	160	6320
531.deepsjeng_r	576	300	2200	294	2250	**294**	**2240**	576	300	2200	294	2250	**294**	**2240**
541.leela_r	576	482	1980	483	1980	**482**	**1980**	576	482	1980	483	1980	**482**	**1980**
548.exchange2_r	576	234	6450	**234**	**6450**	234	6460	576	234	6450	**234**	**6450**	234	6460
557.xz_r	576	526	1180	**526**	**1180**	525	1180	576	525	1190	524	1190	**524**	**1190**
SPECrate®2017_int_base =	**2460**													
SPECrate®2017_int_peak =	**2530**													

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.
```

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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

 Sysinfo program /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Mon Dec 30 06:57:15 2024

 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
 23. BIOS
```

(Continued on next page)

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Platform Notes (Continued)

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

    ---------------------------------------------------------------
    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
       06:57:16 up 4 min,  1 user,  load average: 0.29, 0.51, 0.26
      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) 6188691
      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) 6188691
      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/CPU2017.023/templogs/preenv.intrate.023.0.log --lognum 023.0 --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 9825 144-Core Processor
        vendor_id       : AuthenticAMD
        cpu family      : 26
        model           : 17
        stepping        : 0
        microcode       : 0xb101025
```

(Continued on next page)

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Platform Notes (Continued)

```
   bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
   TLB size        : 192 4K pages
   cpu cores       : 144
   siblings        : 288
   2 physical ids (chips)
   576 processors (hardware threads)
   physical id 0: core ids 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: core ids 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 0: apicids
   0-23,32-55,64-87,96-119,128-151,160-183,192-215,224-247,256-279,288-311,320-343,352-375
   physical id 1: apicids
   512-535,544-567,576-599,608-631,640-663,672-695,704-727,736-759,768-791,800-823,832-855,864-887
 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):                    576
   On-line CPU(s) list:       0-575
   Vendor ID:                 AuthenticAMD
   BIOS Vendor ID:            Advanced Micro Devices, Inc.
   Model name:                AMD EPYC 9825 144-Core Processor
   BIOS Model name:           AMD EPYC 9825 144-Core Processor              Unknown CPU @ 2.2GHz
   BIOS CPU family:           107
   CPU family:                26
   Model:                     17
   Thread(s) per core:        2
   Core(s) per socket:        144
   Socket(s):                 2
   Stepping:                  0
   Frequency boost:           enabled
   CPU(s) scaling MHz:        101%
   CPU max MHz:               2200.0000
   CPU min MHz:               1500.0000
   BogoMIPS:                  4392.97
   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:                    13.5 MiB (288 instances)
  L1i cache:                    9 MiB (288 instances)
  L2 cache:                     288 MiB (288 instances)
  L3 cache:                     768 MiB (24 instances)
  NUMA node(s):                 8
  NUMA node0 CPU(s):            0-35,288-323
  NUMA node1 CPU(s):            36-71,324-359
  NUMA node2 CPU(s):            72-107,360-395
  NUMA node3 CPU(s):            108-143,396-431
  NUMA node4 CPU(s):            144-179,432-467
  NUMA node5 CPU(s):            180-215,468-503
  NUMA node6 CPU(s):            216-251,504-539
  NUMA node7 CPU(s):            252-287,540-575
  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    13.5M  12 Data           1    64      1            64
      L1i      32K       9M   8 Instruction    1    64      1            64
      L2        1M     288M  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: 8 nodes (0-7)
  node 0 cpus: 0-35,288-323
  node 0 size: 192863 MB
  node 0 free: 192309 MB
  node 1 cpus: 36-71,324-359
  node 1 size: 193517 MB
  node 1 free: 192922 MB
  node 2 cpus: 72-107,360-395
  node 2 size: 193517 MB
  node 2 free: 192743 MB
  node 3 cpus: 108-143,396-431
  node 3 size: 193478 MB
  node 3 free: 193028 MB
  node 4 cpus: 144-179,432-467
  node 4 size: 193517 MB
  node 4 free: 192626 MB
  node 5 cpus: 180-215,468-503
  node 5 size: 193517 MB
  node 5 free: 192741 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 6 cpus: 216-251,504-539
   node 6 size: 193517 MB
   node 6 free: 192799 MB
   node 7 cpus: 252-287,540-575
   node 7 size: 193271 MB
   node 7 free: 192426 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  12  12  12  32  32  32  32
     1:  12  10  12  12  32  32  32  32
     2:  12  12  10  12  32  32  32  32
     3:  12  12  12  10  32  32  32  32
     4:  32  32  32  32  10  12  12  12
     5:  32  32  32  32  12  10  12  12
     6:  32  32  32  32  12  12  10  12
     7:  32  32  32  32  12  12  12  10


   -----------------------------------------------------------
   9. /proc/meminfo
     MemTotal:      1584332032 kB


   -----------------------------------------------------------
   10. who -r
     run-level 3 Dec 30 06:53


   -----------------------------------------------------------
   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
                      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 440:
```

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Platform Notes (Continued)

```
      current policy: frequency should be within 1.50 GHz and 2.20 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


  --------------------------------------------------------------
  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  124G  318G  28% /
```

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Platform Notes (Continued)

```
        ----------------------------------------------------------
   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:
       1x Samsung M321R8GA0PB1-CCPPC 64 GB 2 rank 6400, configured at 6000
       21x Samsung M321R8GA0PB2-CCPEC 64 GB 2 rank 6400, configured at 6000
       2x Samsung M321R8GA0PB2-CCPPC 64 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
----------------------------------------------------------------------------------------------


==============================================================================================
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
----------------------------------------------------------------------------------------------
```

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Lenovo Global Technology

ThinkSystem SR645 V3
(2.20 GHz, AMD EPYC 9825)

SPECrate®2017_int_base = 2460

SPECrate®2017_int_peak = 2530

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

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

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++      | 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++
```

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`

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Lenovo Global Technology

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Base Portability Flags (Continued)

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
```

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
```

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Base Other Flags (Continued)

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`
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`

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Peak Optimization Flags (Continued)

502.gcc_r (continued):
```
-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
```

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

SPEC CPU®2017 Integer Rate Result
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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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