SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017\_int\_base = 458$

ThinkSystem SD665 V3
(3.55 GHz,AMD EPYC 9184X)

$SPECrate^{®}2017\_int\_peak = 464$

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

Test Date: Sep-2023
Hardware Availability: Jul-2023
Software Availability: Nov-2022

Benchmark	Copies	base	peak
500.perlbench_r	64	323	
502.gcc_r	64	436	493
505.mcf_r	64	630	
520.omnetpp_r	64	318	
523.xalancbmk_r	64	636	
525.x264_r	64	977	
531.deepsjeng_r	64	328	
541.leela_r	64	315	315
548.exchange2_r	64	911	913
557.xz_r	64	248	249

SPECrate®2017_int_base (458) ----- SPECrate®2017_int_peak (464)

Hardware

CPU Name: AMD EPYC 9184X
 Max MHz: 4200
 Nominal: 3550
Enabled: 32 cores, 2 chips, 2 threads/core
Orderable: 2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 768 MB I+D on chip per chip,
  96 MB shared / 2 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 3.84 TB NVME SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
  Kernel 5.14.21-150400.22-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Lenovo BIOS Version QGE113H 2.10 released Jun-2023
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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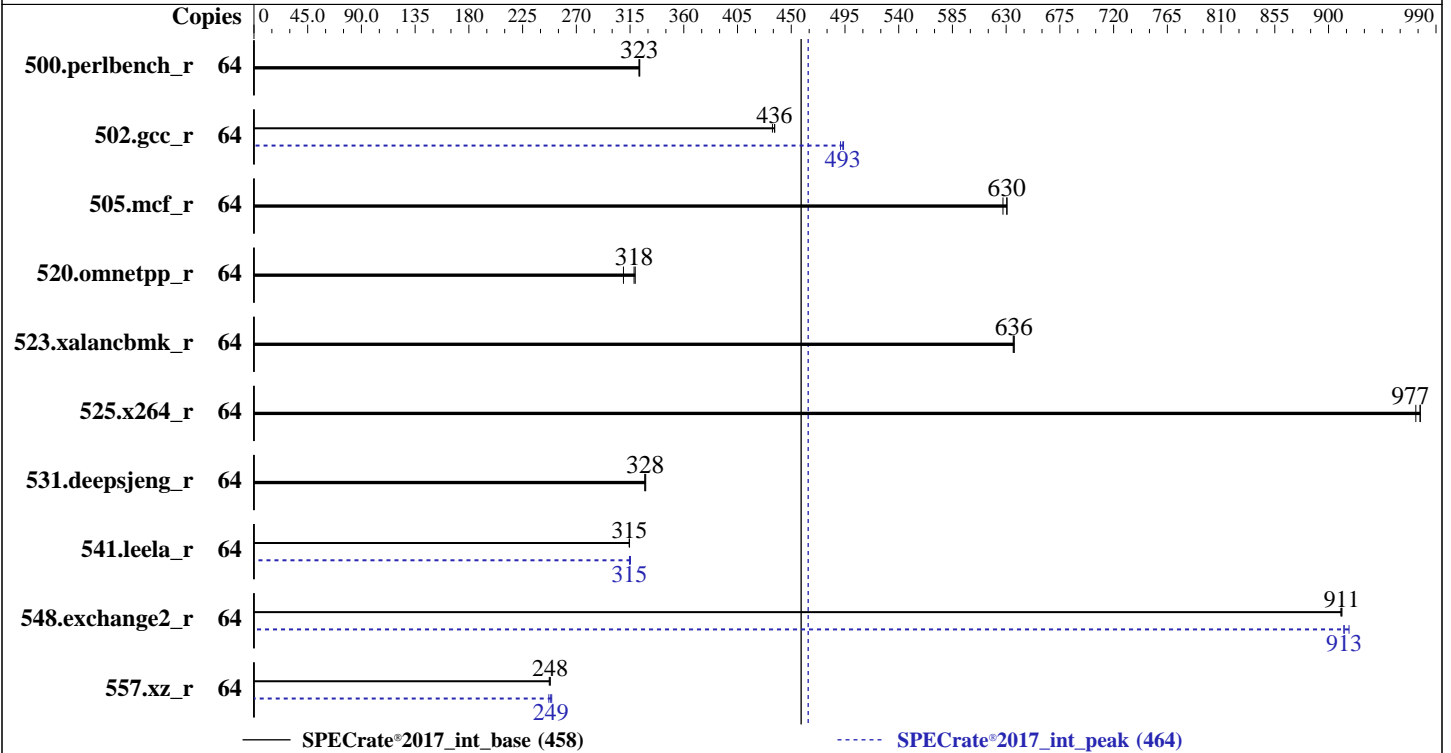
SPECrate®2017_int_peak = 464

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Results Table

Benchmark	Base Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Peak Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	315	323	316	322	**316**	**323**	64	315	323	316	322	**316**	**323**
502.gcc_r	64	209	434	208	436	**208**	**436**	64	184	494	184	491	**184**	**493**
505.mcf_r	64	165	627	164	631	**164**	**630**	64	165	627	164	631	**164**	**630**
520.omnetpp_r	64	**264**	**318**	271	309	263	319	64	**264**	**318**	271	309	263	319
523.xalancbmk_r	64	**106**	**636**	106	636	106	637	64	**106**	**636**	106	636	106	637
525.x264_r	64	115	973	115	977	**115**	**977**	64	115	973	115	977	**115**	**977**
531.deepsjeng_r	64	224	327	**224**	**328**	224	328	64	224	327	**224**	**328**	224	328
541.leela_r	64	337	314	337	315	**337**	**315**	64	336	315	**337**	**315**	337	315
548.exchange2_r	64	**184**	**911**	184	910	184	911	64	183	917	**184**	**913**	184	913
557.xz_r	64	**279**	**248**	279	248	279	247	64	280	247	277	249	**278**	**249**
SPECrate®2017_int_base =						**458**								
SPECrate®2017_int_peak =								**464**						

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.

To enable Transparent Hugepages (THP) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'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-aocc400-znver4-A1.1/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017-1.1.9-amd
    -aocc400-znver4-A1.1/amd_rate_aocc400_znver4_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:
Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA Nodes per Socket set to NPS4

 Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Sun Sep 24 19:11:28 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
 -----------------------------------------------------------
```

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https://www.spec.org/

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Platform Notes (Continued)

```
     ----------------------------------------------------------
     1. uname -a
       Linux localhost 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
        19:11:28 up 1 min,  1 user,  load average: 0.13, 0.05, 0.01
       USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
       root     tty1     -                19:10   16.00s  1.04s  0.09s /bin/bash ./amd_rate_aocc400_znver4_A1.sh

     ----------------------------------------------------------
     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) 3094047
       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) 3094047
       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
      /bin/bash ./speccpu_bergamo.sh
      /bin/bash ./Run025-compliant-amd-rateint.sh
      python3 ./run_amd_rate_aocc400_znver4_A1.py
      /bin/bash ./amd_rate_aocc400_znver4_A1.sh
      runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intrate
      runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
        --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
        $SPEC/tmp/CPU2017.292/templogs/preenv.intrate.292.0.log --lognum 292.0 --from_runcpu 2
      specperl $SPEC/bin/sysinfo
     $SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.1


     ----------------------------------------------------------
     6. /proc/cpuinfo
         model name       : AMD EPYC 9184X 16-Core Processor
         vendor_id        : AuthenticAMD
         cpu family       : 25
         model            : 17
         stepping         : 2
         microcode        : 0xa10123b
         bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
         TLB size         : 3584 4K pages
```

(Continued on next page)

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Platform Notes (Continued)

```
        cpu cores       : 16
        siblings        : 32
        2 physical ids (chips)
        64 processors (hardware threads)
        physical id 0: core ids 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
        physical id 1: core ids 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
        physical id 0: apicids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
        physical id 1: apicids 128-131,144-147,160-163,176-179,192-195,208-211,224-227,240-243
    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:                 52 bits physical, 57 bits virtual
      Byte Order:                    Little Endian
      CPU(s):                        64
      On-line CPU(s) list:           0-63
      Vendor ID:                     AuthenticAMD
      Model name:                    AMD EPYC 9184X 16-Core Processor
      CPU family:                    25
      Model:                         17
      Thread(s) per core:            2
      Core(s) per socket:            16
      Socket(s):                     2
      Stepping:                      2
      Frequency boost:               enabled
      CPU max MHz:                   4208.6909
      CPU min MHz:                   1500.0000
      BogoMIPS:                      7100.22
      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 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
                                     invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase 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
                                     avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
                                     svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                                     pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                                     umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                     avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
      Virtualization:                AMD-V
      L1d cache:                     1 MiB (32 instances)
      L1i cache:                     1 MiB (32 instances)
      L2 cache:                      32 MiB (32 instances)
      L3 cache:                      1.5 GiB (16 instances)
      NUMA node(s):                  8
      NUMA node0 CPU(s):             0-3,32-35
      NUMA node1 CPU(s):             4-7,36-39
      NUMA node2 CPU(s):             8-11,40-43
      NUMA node3 CPU(s):             12-15,44-47
      NUMA node4 CPU(s):             16-19,48-51
```

(Continued on next page)

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Platform Notes (Continued)

```
  NUMA node5 CPU(s):              20-23,52-55
  NUMA node6 CPU(s):              24-27,56-59
  NUMA node7 CPU(s):              28-31,60-63
  Vulnerability Itlb multihit:    Not affected
  Vulnerability L1tf:             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; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, 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      32K       1M    8 Data            1     64       1             64
    L1i      32K       1M    8 Instruction     1     64       1             64
    L2        1M      32M    8 Unified         2   2048       1             64
    L3       96M     1.5G   16 Unified         3  98304       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: 0-3,32-35
  node 0 size: 96470 MB
  node 0 free: 95437 MB
  node 1 cpus: 4-7,36-39
  node 1 size: 96752 MB
  node 1 free: 96483 MB
  node 2 cpus: 8-11,40-43
  node 2 size: 96752 MB
  node 2 free: 96520 MB
  node 3 cpus: 12-15,44-47
  node 3 size: 96752 MB
  node 3 free: 96544 MB
  node 4 cpus: 16-19,48-51
  node 4 size: 96752 MB
  node 4 free: 96526 MB
  node 5 cpus: 20-23,52-55
  node 5 size: 96752 MB
  node 5 free: 96460 MB
  node 6 cpus: 24-27,56-59
  node 6 size: 96752 MB
  node 6 free: 96189 MB
  node 7 cpus: 28-31,60-63
  node 7 size: 96553 MB
  node 7 free: 96316 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
```

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Platform Notes (Continued)

```
    ---------------------------------------------------------------
    9. /proc/meminfo
      MemTotal:       792100840 kB


    ---------------------------------------------------------------
    10. who -r
      run-level 3 Sep 24 19:10


    ---------------------------------------------------------------
    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
                       issue-generator kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections 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 ebtables exchange-bmc-os-info
                       firewalld gpm grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd
                       issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap
                       nvmf-autoconnect rdisc 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-5.14.21-150400.22-default
      root=UUID=9967e7c1-1dd8-42c0-9234-ca3fa2c502ae
      splash=silent
      mitigations=auto
      quiet
      security=apparmor


    ---------------------------------------------------------------
    14. cpupower frequency-info
      analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 3.55 GHz.
                        The governor "performance" may decide which speed to use
                        within this range.
        boost state support:
          Supported: yes
          Active: yes


    ---------------------------------------------------------------
    15. sysctl
      kernel.numa_balancing            1
      kernel.randomize_va_space        0
      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                   8
      vm.dirty_writeback_centisecs     500
```

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Platform Notes (Continued)

```
   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


   -------------------------------------------------------------
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-amd-aocc400-znver4-A1.1
   Filesystem    Type  Size  Used Avail Use% Mounted on
   /dev/nvme0n1p3 xfs   3.5T  127G  3.4T   4% /


   -------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
      Vendor:         Lenovo
      Product:        ThinkSystem SD665 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
    12x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
     3x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800
     2x Samsung M321R4GA3BB6-CQKEG 32 GB 2 rank 4800
     6x Samsung M321R4GA3BB6-CQKVG 32 GB 2 rank 4800
```

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Platform Notes (Continued)

```
  ------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Lenovo
    BIOS Version:      QGE113H-2.10
    BIOS Date:         06/28/2023
    BIOS Revision:     2.10
    Firmware Revision: 2.11
```

Compiler Version Notes

```
==============================================================================
C        | 502.gcc_r(peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C        | 502.gcc_r(peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------
```

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Lenovo Global Technology

ThinkSystem SD665 V3
(3.55 GHz,AMD EPYC 9184X)

SPECrate®2017_int_base = 458

SPECrate®2017_int_peak = 464

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

Test Date: Sep-2023
Hardware Availability: Jul-2023
Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
==============================================================================================
Fortran | 548.exchange2_r(base, peak)
----------------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
```

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Lenovo Global Technology

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Base Optimization Flags (Continued)

C benchmarks (continued):
```
-lamdalloc
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -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=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

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++
```

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Peak Compiler Invocation (Continued)

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 -z muldefs -Ofast -march=znver4`
`-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: `basepeak = yes`

525.x264_r: `basepeak = yes`

557.xz_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver4 -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 -lamdlibm`
`-lflang -lamdalloc`

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Lenovo Global Technology

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Peak Optimization Flags (Continued)

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `basepeak = yes`

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver4 -fveclib=AMDLIBM -ffast-math`
`-finline-aggressive -mllvm -unroll-threshold=100`
`-mllvm -reduce-array-computations=3 -zopt`
`-fvirtual-function-elimination -fvisibility=hidden`
`-lamdlibm -lflang -lamdalloc-ext`

Fortran benchmarks:
`-m64 -flto -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 -O3 -march=znver4 -fveclib=AMDLIBM`
`-ffast-math -fepilog-vectorization-of-inductions`
`-mllvm -optimize-strided-mem-cost -floop-transform`
`-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm`
`-lflang -lamdalloc`

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/aocc4/znver4/rate/amd_rate_aocc400_znver4_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-Genoa-T.html
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.html

SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 458

ThinkSystem SD665 V3
(3.55 GHz,AMD EPYC 9184X)

SPECrate®2017_int_peak = 464

CPU2017 License: 9017		**Test Date:**	Sep-2023
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Jul-2023
Tested by:	Lenovo Global Technology	**Software Availability:**	Nov-2022

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-Genoa-T.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.xml

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

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