SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SD535 V3
(2.45 GHz, AMD EPYC 9534)

$SPECrate®2017\_int\_base = 607$
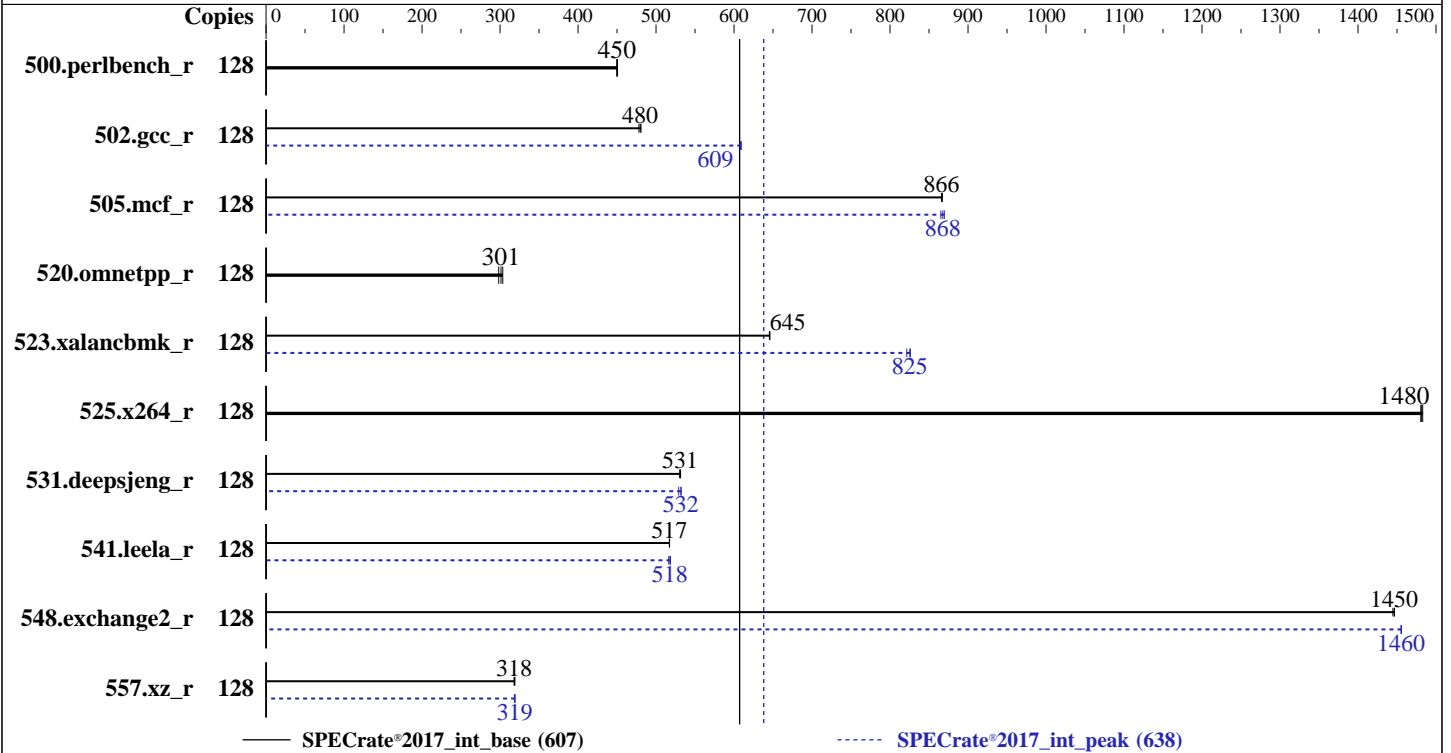
$SPECrate®2017\_int\_peak = 638$

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

Test Date: May-2024
Hardware Availability: May-2024
Software Availability: Mar-2024

Benchmark	Copies	base	peak
500.perlbench_r	128	450	
502.gcc_r	128	480	609
505.mcf_r	128	866	868
520.omnetpp_r	128	301	
523.xalancbmk_r	128	645	825
525.x264_r	128	1480	
531.deepsjeng_r	128	531	532
541.leela_r	128	517	518
548.exchange2_r	128	1450	1460
557.xz_r	128	318	319

SPECrate®2017_int_base (607)   SPECrate®2017_int_peak (638)

Hardware

CPU Name: AMD EPYC 9534
 Max MHz: 3700
 Nominal: 2450
Enabled: 64 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 32 MB shared / 8 cores
 Other: None
Memory: 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 960 GB M.2 SATA SSD
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP5
 Kernel 5.14.21-150500.53-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Lenovo BIOS Version GPE103I 1.10 released Mar-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	128	452	451	**453**	**450**	453	450	128	452	451	**453**	**450**	453	450
502.gcc_r	128	377	481	379	478	**378**	**480**	128	298	608	**298**	**609**	297	609
505.mcf_r	128	**239**	**866**	239	866	239	867	128	239	865	238	870	**238**	**868**
520.omnetpp_r	128	563	298	**557**	**301**	553	303	128	563	298	**557**	**301**	553	303
523.xalancbmk_r	128	**209**	**645**	209	645	209	646	128	165	821	**164**	**825**	164	826
525.x264_r	128	151	1480	**151**	**1480**	151	1480	128	151	1480	**151**	**1480**	151	1480
531.deepsjeng_r	128	276	531	**276**	**531**	277	530	128	**276**	**532**	277	529	276	532
541.leela_r	128	410	517	**410**	**517**	410	517	128	411	516	**409**	**518**	409	519
548.exchange2_r	128	232	1440	**232**	**1450**	232	1450	128	**230**	**1460**	230	1460	230	1460
557.xz_r	128	433	319	435	318	**434**	**318**	128	434	318	433	319	**434**	**319**
SPECrate®2017_int_base =		**607**												
SPECrate®2017_int_peak =		**638**												

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) 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

(Continued on next page)

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Operating System Notes (Continued)

```
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

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-A1.2/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017-1.1.9-amd
    -aocc400-znver4-A1.2/amd_rate_aocc400_znver4_A_lib/lib32:"
MALLOC_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:never"
```

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-A1.2/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Mon May 27 09:49:24 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 249 (249.16+suse.171.gdad0071f15)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
```

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Platform Notes (Continued)

```
    15. cpupower frequency-info
    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
    ------------------------------------------------------------

    ------------------------------------------------------------
    1. uname -a
      Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
      x86_64 x86_64 x86_64 GNU/Linux

    ------------------------------------------------------------
    2. w
       09:49:24 up 19:16,  1 user,  load average: 0.07, 0.02, 0.00
      USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
      root     tty1     -                Sun14    1:16   1.12s  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) 1546386
      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) 1546386
      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 ./run_SD535V3_genoa-X_1.03.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/CPU2017.302/templogs/preenv.intrate.302.0.log --lognum 302.0 --from_runcpu 2
     specperl $SPEC/bin/sysinfo
     $SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
```

(Continued on next page)

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Platform Notes (Continued)

```
         ----------------------------------------------------------
      6. /proc/cpuinfo
         model name      : AMD EPYC 9534 64-Core Processor
         vendor_id       : AuthenticAMD
         cpu family      : 25
         model           : 17
         stepping        : 1
         microcode       : 0xa101144
         bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
         TLB size        : 3584 4K pages
         cpu cores       : 64
         siblings        : 128
         1 physical ids (chips)
         128 processors (hardware threads)
         physical id 0: core ids 0-63
         physical id 0: apicids 0-127
       Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
       virtualized systems.  Use the above data carefully.


         ----------------------------------------------------------
      7. lscpu

       From lscpu from util-linux 2.37.4:
         Architecture:                 x86_64
         CPU op-mode(s):               32-bit, 64-bit
         Address sizes:                52 bits physical, 57 bits virtual
         Byte Order:                   Little Endian
         CPU(s):                       128
         On-line CPU(s) list:          0-127
         Vendor ID:                    AuthenticAMD
         Model name:                   AMD EPYC 9534 64-Core Processor
         CPU family:                   25
         Model:                        17
         Thread(s) per core:           2
         Core(s) per socket:           64
         Socket(s):                    1
         Stepping:                     1
         Frequency boost:              enabled
         CPU max MHz:                  3718.0659
         CPU min MHz:                  1500.0000
         BogoMIPS:                     4892.65
         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 invpcid_single hw_pstate ssbd mba perfmon_v2 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 cppc 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
```

(Continued on next page)

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Platform Notes (Continued)

```
  L1d cache:                      2 MiB (64 instances)
  L1i cache:                      2 MiB (64 instances)
  L2 cache:                       64 MiB (64 instances)
  L3 cache:                       256 MiB (8 instances)
  NUMA node(s):                   4
  NUMA node0 CPU(s):              0-15,64-79
  NUMA node1 CPU(s):              16-31,80-95
  NUMA node2 CPU(s):              32-47,96-111
  NUMA node3 CPU(s):              48-63,112-127
  Vulnerability Itlb multihit:    Not affected
  Vulnerability L1tf:             Not affected
  Vulnerability Mds:              Not affected
  Vulnerability Meltdown:         Not affected
  Vulnerability Mmio stale data:  Not affected
  Vulnerability Retbleed:         Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
  Vulnerability Spectre v1:       Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:       Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                  filling, PBRSB-eIBRS 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       32K      2M    8 Data           1    64      1            64
      L1i       32K      2M    8 Instruction    1    64      1            64
      L2         1M     64M    8 Unified        2  2048      1            64
      L3        32M    256M   16 Unified        3 32768      1            64

  ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0-15,64-79
    node 0 size: 96458 MB
    node 0 free: 95964 MB
    node 1 cpus: 16-31,80-95
    node 1 size: 96725 MB
    node 1 free: 96017 MB
    node 2 cpus: 32-47,96-111
    node 2 size: 96759 MB
    node 2 free: 96227 MB
    node 3 cpus: 48-63,112-127
    node 3 size: 96682 MB
    node 3 free: 96080 MB
    node distances:
    node   0   1   2   3
      0:  10  20  20  20
      1:  20  10  20  20
      2:  20  20  10  20
      3:  20  20  20  10

  ------------------------------------------------------------
  9. /proc/meminfo
    MemTotal:       395905600 kB

  ------------------------------------------------------------
  10. who -r
    run-level 3 May 26 14:33
```

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Platform Notes (Continued)

```
    -------------------------------------------------------------
    11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
      Default Target  Status
      multi-user      degraded


    -------------------------------------------------------------
    12. Failed units, from systemctl list-units --state=failed
         UNIT              LOAD   ACTIVE SUB    DESCRIPTION
       * ntp_sync.service loaded failed failed ntp_sync.service


    -------------------------------------------------------------
    13. 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 smartd sshd
                          systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
         enabled-runtime  systemd-remount-fs
         disabled         autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                          chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                          firewalld gpm grub2-once haveged haveged-switch-root 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
                          systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                          systemd-time-wait-sync systemd-timesyncd
         generated        ntp_sync
         indirect         wickedd


    -------------------------------------------------------------
    14. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
      root=UUID=2b8d3d82-44aa-4750-bc54-9d507d1ea188
      splash=silent
      mitigations=auto
      quiet
      security=apparmor


    -------------------------------------------------------------
    15. cpupower frequency-info
      analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 2.45 GHz.
                        The governor "performance" may decide which speed to use
                        within this range.
      boost state support:
        Supported: yes
        Active: yes


    -------------------------------------------------------------
    16. 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
      vm.dirtytime_expire_seconds     43200
      vm.extfrag_threshold            500
      vm.min_unmapped_ratio           1
```

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Platform Notes (Continued)

```
   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 SP5


----------------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
   Filesystem    Type  Size  Used Avail Use% Mounted on
   /dev/sda3     xfs   890G   28G  863G   4% /


----------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
   Vendor:          Lenovo
   Product:         ThinkSystem SD535V3 MB
   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:
     8x SK Hynix HMCG88AEBRA168N 32 GB 2 rank 4800
     4x SK Hynix HMCG88AEBRA173N 32 GB 2 rank 4800



----------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:      Lenovo
   BIOS Version:     GPE103I-1.10
   BIOS Date:        03/19/2024
```

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Platform Notes (Continued)

```
    BIOS Revision:     1.10
    Firmware Revision: 0.50
```

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++      | 523.xalancbmk_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++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 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
```

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Lenovo Global Technology

ThinkSystem SD535 V3
(2.45 GHz, AMD EPYC 9534)

SPECrate®2017_int_base = 607

SPECrate®2017_int_peak = 638

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

Test Date: May-2024
Hardware Availability: May-2024
Software Availability: Mar-2024

Compiler Version Notes (Continued)

```
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------


==============================================================================
C++    | 523.xalancbmk_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++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 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
--------------------------------------------------------------------------------


==============================================================================
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`

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Base 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`

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
-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
```

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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 -z muldefs -Ofast -march=znver4`
`-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`

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Peak Optimization Flags (Continued)

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

525.x264_r: `basepeak = yes`

557.xz_r: `Same as 505.mcf_r`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `-m32 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-fno-loop-reroll -Ofast -march=znver4 -fveclib=AMDLIBM
-ffast-math -finline-aggressive
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdalloc-ext
```

531.deepsjeng_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3 -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 -lamdalloc-ext
```

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
```

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SPEC CPU®2017 Integer Rate Result
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Peak Optimization Flags (Continued)

541.leela_r (continued):
```
-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 (except as noted below):
```
-Wno-unused-command-line-argument
```

523.xalancbmk_r: `-L/usr/lib32 -Wno-unused-command-line-argument`
`-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32`

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

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

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