SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017\_int\_base = 1510$

ThinkSystem SD535 V3
(2.25 GHz, AMD EPYC 9965)

$SPECrate^{®}2017\_int\_peak = 1570$

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

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

	Copies		
500.perlbench_r	384	1220	
502.gcc_r	384	852	
	192	1150	
505.mcf_r	384	1750	
520.omnetpp_r	384	550	
523.xalancbmk_r	384	2130	
	192	2410	
525.x264_r	384	4390	
531.deepsjeng_r	384	1520	
541.leela_r	384	1350	
		1350	
548.exchange2_r	384	4390	
557.xz_r	384	726	
		727	

——— SPECrate®2017_int_base (1510)   ----- SPECrate®2017_int_peak (1570)

Hardware

CPU Name: AMD EPYC 9965
  Max MHz: 3700
  Nominal: 2250
Enabled: 192 cores, 1 chip, 2 threads/core
Orderable: 1 chip
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 / 16 cores
  Other: None
Memory: 768 GB (12 x 64 GB 2Rx4 PC5-6400B-R, running at 6000)
Storage: 1 x 960 GB M.2 NVMe 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 GPE113A 4.10 released Sep-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 set to prefer performance at the cost of additional power usage

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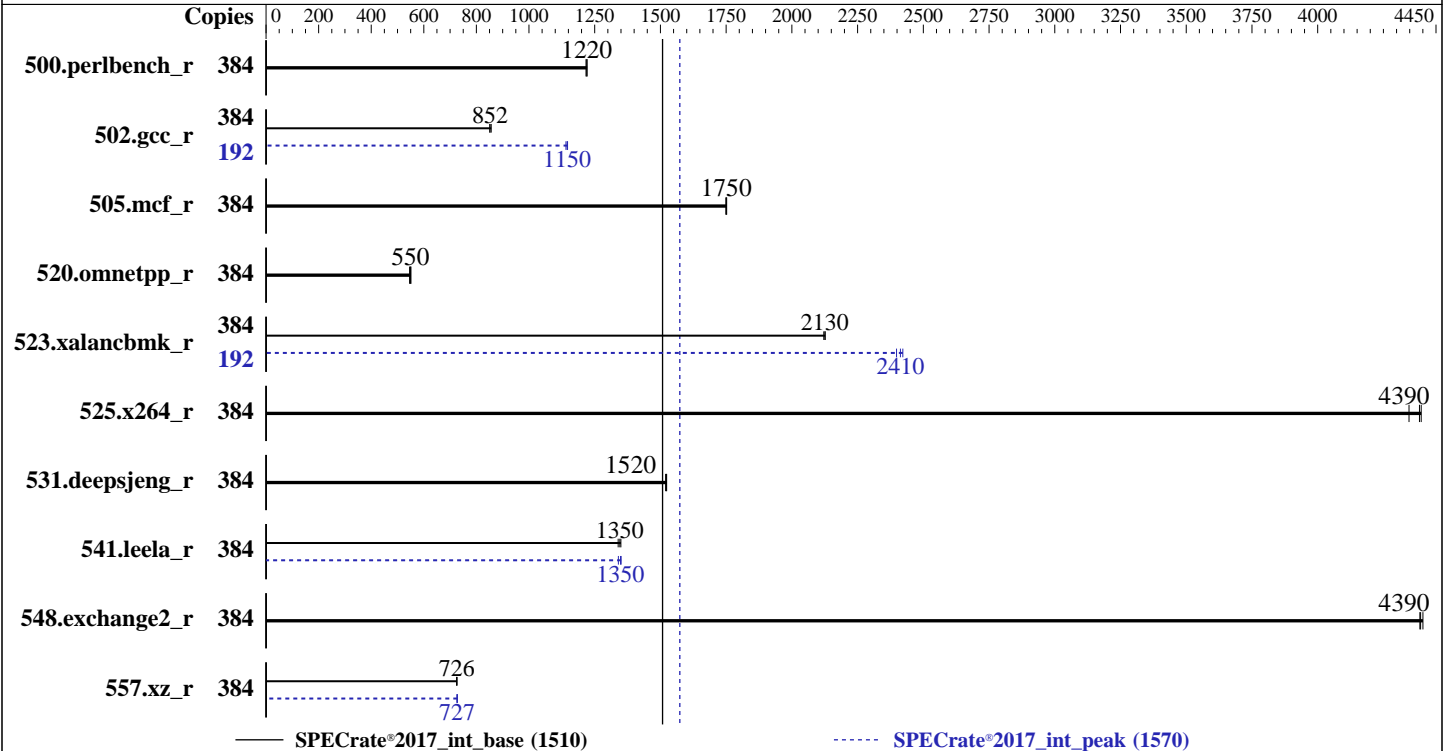
SPECrate®2017_int_peak = 1570

CPU2017 License: 9017	**Test Date:** Nov-2024
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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	384	501	1220	**501**	**1220**	502	1220	384	501	1220	**501**	**1220**	502	1220
502.gcc_r	384	639	851	**638**	**852**	635	856	192	237	1150	**237**	**1150**	238	1140
505.mcf_r	384	**354**	**1750**	355	1750	354	1750	384	**354**	**1750**	355	1750	354	1750
520.omnetpp_r	384	923	546	914	551	**917**	**550**	384	923	546	914	551	**917**	**550**
523.xalancbmk_r	384	**191**	**2130**	191	2130	191	2120	192	84.5	2400	**84.0**	**2410**	83.7	2420
525.x264_r	384	153	4390	**153**	**4390**	155	4350	384	153	4390	**153**	**4390**	155	4350
531.deepsjeng_r	384	289	1520	290	1520	**289**	**1520**	384	289	1520	290	1520	**289**	**1520**
541.leela_r	384	471	1350	475	1340	**473**	**1350**	384	**472**	**1350**	471	1350	475	1340
548.exchange2_r	384	229	4390	229	4400	**229**	**4390**	384	229	4390	229	4400	**229**	**4390**
557.xz_r	384	**571**	**726**	571	726	572	725	384	571	727	570	727	**571**	**727**
SPECrate®2017_int_base =	**1510**												
SPECrate®2017_int_peak =	**1570**												

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) for all allocations:
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

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

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Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.9-amd-aocc500_znver5_A1/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017-1.1.9-amd-a
     occ500_znver5_A1/amd_rate_aocc500_znver5_A_lib/lib32:"
MALLOC_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:always"
```

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
NUMA Nodes per Socket set to NPS4
ACPI SRAT L3 Cache as NUMA Domain set to Enabled
L1 Stride Prefetcher set to Disabled
L1 Region Prefetcher set to Disabled
P-State set to Enabled

 Sysinfo program /home/cpu2017-1.1.9-amd-aocc500_znver5_A1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Thu Nov 14 18:41:55 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. sysctl
 16. /sys/kernel/mm/transparent_hugepage
 17. /sys/kernel/mm/transparent_hugepage/khugepaged
```

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Platform Notes (Continued)

```
 18. OS release
 19. Disk information
 20. /sys/devices/virtual/dmi/id
 21. dmidecode
 22. BIOS
    -----------------------------------------------------------


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


    -----------------------------------------------------------
 2. w
    18:41:55 up 4 min,  1 user,  load average: 0.25, 0.21, 0.10
   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) 3093383
   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) 3093383
   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/CPU2017.120/templogs/preenv.intrate.120.0.log --lognum 120.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
  $SPEC = /home/cpu2017-1.1.9-amd-aocc500_znver5_A1


    -----------------------------------------------------------
 6. /proc/cpuinfo
     model name      : AMD EPYC 9965 192-Core Processor
```

(Continued on next page)

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Platform Notes (Continued)

```
        vendor_id        : AuthenticAMD
        cpu family       : 26
        model            : 17
        stepping         : 0
        microcode        : 0xb101021
        bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
        TLB size         : 192 4K pages
        cpu cores        : 192
        siblings         : 384
        1 physical ids (chips)
        384 processors (hardware threads)
        physical id 0: core ids 0-191
        physical id 0: apicids 0-383
   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):                384
     On-line CPU(s) list:   0-383
     Vendor ID:             AuthenticAMD
     BIOS Vendor ID:        Advanced Micro Devices, Inc.
     Model name:            AMD EPYC 9965 192-Core Processor
     BIOS Model name:       AMD EPYC 9965 192-Core Processor          Unknown CPU @ 2.2GHz
     BIOS CPU family:       107
     CPU family:            26
     Model:                 17
     Thread(s) per core:    2
     Core(s) per socket:    192
     Socket(s):             1
     Stepping:              0
     Frequency boost:       enabled
     CPU(s) scaling MHz:    101%
     CPU max MHz:           2250.0000
     CPU min MHz:           1500.0000
     BogoMIPS:              4493.18
     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
```

(Continued on next page)

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Platform Notes (Continued)

```
                               movdiri movdir64b overflow_recov succor smca fsrm avx512_vp2intersect
                               flush_l1d debug_swap
  Virtualization:              AMD-V
  L1d cache:                   9 MiB (192 instances)
  L1i cache:                   6 MiB (192 instances)
  L2 cache:                    192 MiB (192 instances)
  L3 cache:                    384 MiB (12 instances)
  NUMA node(s):                12
  NUMA node0 CPU(s):           0-15,192-207
  NUMA node1 CPU(s):           16-31,208-223
  NUMA node2 CPU(s):           32-47,224-239
  NUMA node3 CPU(s):           48-63,240-255
  NUMA node4 CPU(s):           64-79,256-271
  NUMA node5 CPU(s):           80-95,272-287
  NUMA node6 CPU(s):           96-111,288-303
  NUMA node7 CPU(s):           112-127,304-319
  NUMA node8 CPU(s):           128-143,320-335
  NUMA node9 CPU(s):           144-159,336-351
  NUMA node10 CPU(s):          160-175,352-367
  NUMA node11 CPU(s):          176-191,368-383
  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        9M   12 Data            1    64      1         64
      L1i     32K        6M    8 Instruction     1    64      1         64
      L2       1M      192M   16 Unified         2  1024      1         64
      L3      32M      384M   16 Unified         3 32768      1         64

  ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 12 nodes (0-11)
    node 0 cpus: 0-15,192-207
    node 0 size: 64017 MB
    node 0 free: 63309 MB
    node 1 cpus: 16-31,208-223
    node 1 size: 64503 MB
    node 1 free: 64129 MB
    node 2 cpus: 32-47,224-239
    node 2 size: 64503 MB
    node 2 free: 64110 MB
    node 3 cpus: 48-63,240-255
    node 3 size: 64503 MB
    node 3 free: 64111 MB
    node 4 cpus: 64-79,256-271
```

<div align="center">(Continued on next page)</div>

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```
   node 4 size: 64503 MB
   node 4 free: 64106 MB
   node 5 cpus: 80-95,272-287
   node 5 size: 64503 MB
   node 5 free: 64079 MB
   node 6 cpus: 96-111,288-303
   node 6 size: 64503 MB
   node 6 free: 64103 MB
   node 7 cpus: 112-127,304-319
   node 7 size: 64503 MB
   node 7 free: 64091 MB
   node 8 cpus: 128-143,320-335
   node 8 size: 64465 MB
   node 8 free: 64067 MB
   node 9 cpus: 144-159,336-351
   node 9 size: 64503 MB
   node 9 free: 64121 MB
   node 10 cpus: 160-175,352-367
   node 10 size: 64503 MB
   node 10 free: 64101 MB
   node 11 cpus: 176-191,368-383
   node 11 size: 64358 MB
   node 11 free: 63978 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11
     0:  10  11  11  12  12  12  12  12  12  12  12  12
     1:  11  10  11  12  12  12  12  12  12  12  12  12
     2:  11  11  10  12  12  12  12  12  12  12  12  12
     3:  12  12  12  10  11  11  12  12  12  12  12  12
     4:  12  12  12  11  10  11  12  12  12  12  12  12
     5:  12  12  12  11  11  10  12  12  12  12  12  12
     6:  12  12  12  12  12  12  10  11  11  12  12  12
     7:  12  12  12  12  12  12  11  10  11  12  12  12
     8:  12  12  12  12  12  12  11  11  10  12  12  12
     9:  12  12  12  12  12  12  12  12  12  10  11  11
    10:  12  12  12  12  12  12  12  12  12  11  10  11
    11:  12  12  12  12  12  12  12  12  12  11  11  10

   --------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       791933288 kB


   --------------------------------------------------------------
10. who -r
   run-level 3 Nov 14 18:37


   --------------------------------------------------------------
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 nvmefc-boot-connections nvmf-autoconnect 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
```

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Platform Notes (Continued)

```
                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 systemd-boot-check-no-failures
                systemd-confext systemd-network-generator systemd-sysext systemd-time-wait-sync
                systemd-timesyncd
  generated     ntp_sync
  indirect      systemd-userdbd wickedd


  -----------------------------------------------------------
  13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.21-default
    root=UUID=842e182e-1d59-4d37-9172-9b67b51720c1
    splash=silent
    mitigations=auto
    quiet
    security=apparmor


  -----------------------------------------------------------
  14. cpupower frequency-info
    analyzing CPU 5:
      current policy: frequency should be within 1.50 GHz and 2.25 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
    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
```

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Platform Notes (Continued)

```
   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 SP6


  --------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-amd-aocc500_znver5_A1
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/nvme0n1p2 xfs   894G   44G  851G   5% /


  --------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
     Vendor:         Lenovo
     Product:        ThinkSystem SD535 V3
     Product Family: ThinkSystem
     Serial:         1234567890


  --------------------------------------------------------------
21. 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:
    3x SK Hynix HMCG94AHBRA275N 64 GB 2 rank 6400, configured at 6000
    4x SK Hynix HMCG94AHBRA277N 64 GB 2 rank 6400, configured at 6000
    3x SK Hynix HMCG94AHBRA281N 64 GB 2 rank 6400, configured at 6000
    2x SK Hynix HMCG94AHBRA283N 64 GB 2 rank 6400, configured at 6000


  --------------------------------------------------------------
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      Lenovo
     BIOS Version:     GPE113A-4.10
     BIOS Date:        09/30/2024
     BIOS Revision:    4.10
     Firmware Revision: 5.10
```

Compiler Version Notes

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

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

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SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

ThinkSystem SD535 V3
(2.25 GHz, AMD EPYC 9965)

SPECrate®2017_int_base = 1510

SPECrate®2017_int_peak = 1570

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

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


===========================================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
         | 557.xz_r(base, peak)
-------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-------------------------------------------------------------------------------------------


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


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

Base Compiler Invocation

C benchmarks:
```
clang
```

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

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Lenovo Global Technology

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Base Compiler Invocation (Continued)

Fortran benchmarks:
```
flang
```

Base Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

Base Optimization Flags

C benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-Wl,-mllvm -Wl,-extra-inliner -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdalloc-ext -ldl
```

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

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
```

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Lenovo Global Technology

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

Base Optimization Flags (Continued)

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

Base Other Flags

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

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

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Peak Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
```

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Peak Portability Flags (Continued)

531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Peak Optimization Flags

C benchmarks:

500.perlbench_r: `basepeak = yes`

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

505.mcf_r: `basepeak = yes`

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: `-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 -Ofast`
`-march=znver5 -fveclib=AMDLIBM -ffast-math -flto`

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SPEC CPU®2017 Integer Rate Result

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Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):
```
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-mllvm -do-block-reorder=advanced -lamdlibm -lflang
-lamdalloc-ext -ldl
```

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `-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 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100
-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:

548.exchange2_r: `basepeak = yes`

Peak Other Flags

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

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

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Turin-B.html
http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.html

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

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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-B.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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