SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

ThinkSystem SD665 V3
(3.60 GHz, AMD EPYC 9474F)

$SPECrate^{®}2017\_int\_base = 1110$

$SPECrate^{®}2017\_int\_peak = 1170$

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Benchmark	Copies	Base	Peak
500.perlbench_r	192	812	
502.gcc_r	192	894	1120
505.mcf_r	192	1610	
520.omnetpp_r	192	521	
523.xalancbmk_r	192	1290	1650
525.x264_r	192	2830	
531.deepsjeng_r	192	952	
541.leela_r	192	923	
548.exchange2_r	192	2720	
557.xz_r	192	546	

SPECrate®2017_int_base (1110) ----- SPECrate®2017_int_peak (1170)

Hardware

CPU Name: AMD EPYC 9474F
 Max MHz: 4100
 Nominal: 3600
Enabled: 96 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: 256 MB I+D on chip per chip,
 32 MB shared / 6 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 QGE109D 1.20 released Jan-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

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

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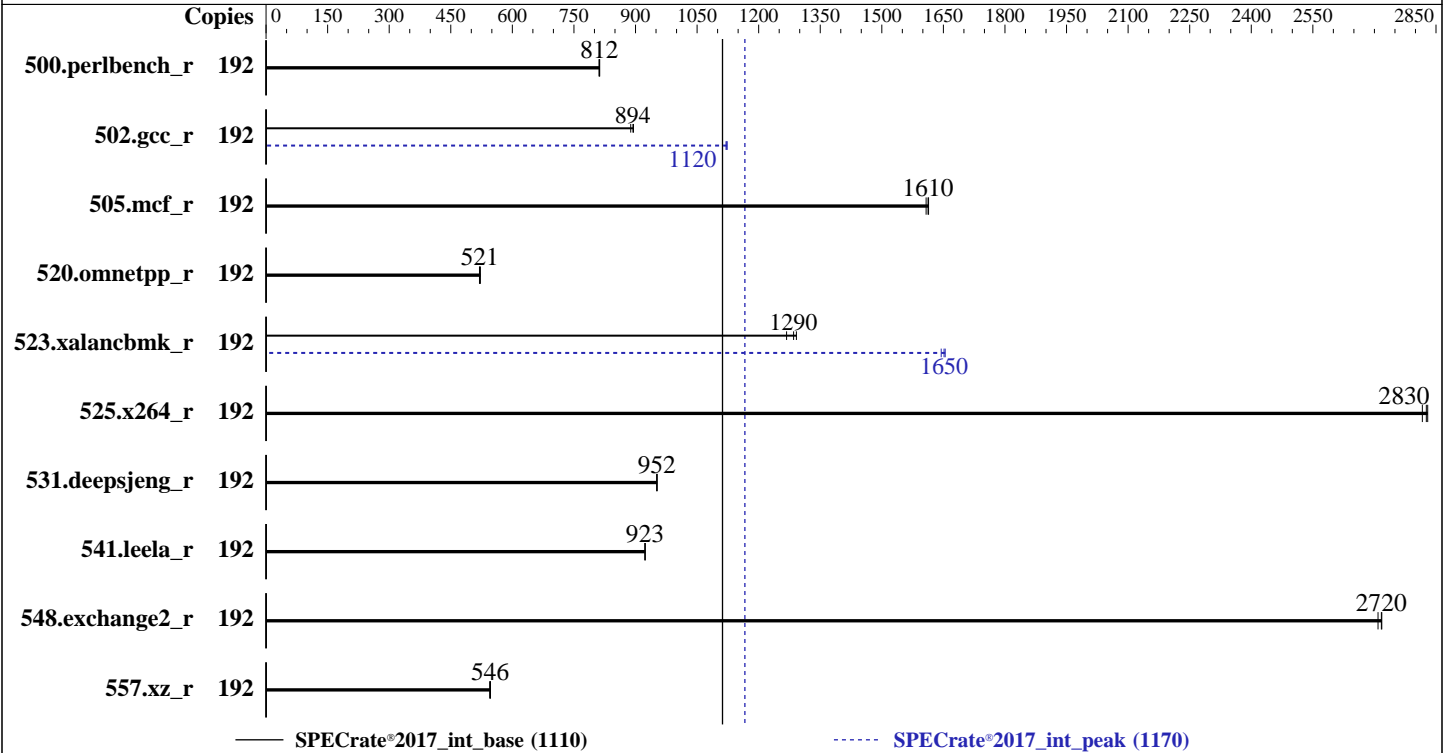
SPECrate®2017_int_peak = 1170

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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	192	**376**	**812**	377	811	376	813	192	**376**	**812**	377	811	376	813
502.gcc_r	192	304	895	306	888	**304**	**894**	192	242	1120	**242**	**1120**	243	1120
505.mcf_r	192	192	1610	**192**	**1610**	193	1610	192	192	1610	**192**	**1610**	193	1610
520.omnetpp_r	192	483	522	**484**	**521**	485	520	192	483	522	**484**	**521**	485	520
523.xalancbmk_r	192	157	1290	**158**	**1290**	160	1270	192	123	1650	**123**	**1650**	123	1640
525.x264_r	192	119	2820	119	2830	**119**	**2830**	192	119	2820	119	2830	**119**	**2830**
531.deepsjeng_r	192	231	953	231	952	**231**	**952**	192	231	953	231	952	**231**	**952**
541.leela_r	192	**344**	**923**	344	924	344	923	192	**344**	**923**	344	924	344	923
548.exchange2_r	192	186	2710	185	2720	**185**	**2720**	192	186	2710	185	2720	**185**	**2720**
557.xz_r	192	**380**	**546**	379	547	381	545	192	**380**	**546**	379	547	381	545
SPECrate®2017_int_base =	**1110**													
SPECrate®2017_int_peak =	**1170**													

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.

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Operating System Notes (Continued)

```
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.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/home/cpu2017-1.1.9-amd-aocc400-genoa-B1c/amd_rate_aocc400_genoa_B_lib/
      lib:/home/cpu2017-1.1.9-amd-aocc400-genoa-B1c/amd_rate_aocc400_genoa_B_l
      ib/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
ACPI SRAT L3 Cache as NUMA Domain set to Enabled

 Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-genoa-B1c/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Mon Jan 30 21:09:05 2023

 SUT (System Under Test) info as seen by some common utilities.
```

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Platform Notes (Continued)

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


   ----------------------------------------------------------------
   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
     21:09:05 up 53 min,  1 user,  load average: 3.89, 86.57, 139.44
    USER       TTY        FROM              LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                 20:16   33.00s  1.13s  0.16s /bin/bash ./amd_rate_aocc400_genoa_B1.sh

   ----------------------------------------------------------------
   3. Username
     From environment variable $USER:  root


   ----------------------------------------------------------------
   4. ulimit -a
     core file size          (blocks, -c) unlimited
     data seg size           (kbytes, -d) unlimited
```

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Platform Notes (Continued)

```
   scheduling priority             (-e) 0
   file size              (blocks, -f) unlimited
   pending signals                 (-i) 3094041
   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) 3094041
   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_SD665V3_genoa.sh
 /bin/bash ./Run025-compliant-amd-rateint.sh
 python3 ./run_amd_rate_aocc400_genoa_B1.py
 /bin/bash ./amd_rate_aocc400_genoa_B1.sh
 runcpu --config amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 intrate
 runcpu --configfile amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower --runmode
   rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.003/templogs/preenv.intrate.003.0.log --lognum 003.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-amd-aocc400-genoa-B1c


   ----------------------------------------------------------
6. /proc/cpuinfo
   model name       : AMD EPYC 9474F 48-Core Processor
   vendor_id        : AuthenticAMD
   cpu family       : 25
   model            : 17
   stepping         : 1
   microcode        : 0xa101111
   bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
   TLB size         : 3584 4K pages
   cpu cores        : 48
   siblings         : 96
   2 physical ids (chips)
   192 processors (hardware threads)
   physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
   physical id 1: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
```

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Platform Notes (Continued)

```
      physical id 0: apicids 0-11,16-27,32-43,48-59,64-75,80-91,96-107,112-123
      physical id 1: apicids 128-139,144-155,160-171,176-187,192-203,208-219,224-235,240-251
   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):                    192
    On-line CPU(s) list:       0-191
    Vendor ID:                 AuthenticAMD
    Model name:                AMD EPYC 9474F 48-Core Processor
    CPU family:                25
    Model:                     17
    Thread(s) per core:        2
    Core(s) per socket:        48
    Socket(s):                 2
    Stepping:                  1
    Frequency boost:           enabled
    CPU max MHz:               4113.2808
    CPU min MHz:               1500.0000
    BogoMIPS:                  7199.80
   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:                 3 MiB (96 instances)
    L1i cache:                 3 MiB (96 instances)
    L2 cache:                  96 MiB (96 instances)
```

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Platform Notes (Continued)

```
  L3 cache:                           512 MiB (16 instances)
  NUMA node(s):                       16
  NUMA node0 CPU(s):                  0-5,96-101
  NUMA node1 CPU(s):                  6-11,102-107
  NUMA node2 CPU(s):                  12-17,108-113
  NUMA node3 CPU(s):                  18-23,114-119
  NUMA node4 CPU(s):                  24-29,120-125
  NUMA node5 CPU(s):                  30-35,126-131
  NUMA node6 CPU(s):                  36-41,132-137
  NUMA node7 CPU(s):                  42-47,138-143
  NUMA node8 CPU(s):                  48-53,144-149
  NUMA node9 CPU(s):                  54-59,150-155
  NUMA node10 CPU(s):                 60-65,156-161
  NUMA node11 CPU(s):                 66-71,162-167
  NUMA node12 CPU(s):                 72-77,168-173
  NUMA node13 CPU(s):                 78-83,174-179
  NUMA node14 CPU(s):                 84-89,180-185
  NUMA node15 CPU(s):                 90-95,186-191
  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       3M   8 Data             1    64       1              64
      L1i       32K       3M   8 Instruction      1    64       1              64
      L2         1M      96M   8 Unified          2  2048       1              64
      L3        32M     512M  16 Unified          3 32768       1              64


  -----------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 16 nodes (0-15)
    node 0 cpus: 0-5,96-101
    node 0 size: 48128 MB
    node 0 free: 46111 MB
    node 1 cpus: 6-11,102-107
    node 1 size: 48375 MB
    node 1 free: 47885 MB
    node 2 cpus: 12-17,108-113
```

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```
       node 2 size: 48375 MB
       node 2 free: 47882 MB
       node 3 cpus: 18-23,114-119
       node 3 size: 48375 MB
       node 3 free: 47914 MB
       node 4 cpus: 24-29,120-125
       node 4 size: 48375 MB
       node 4 free: 47808 MB
       node 5 cpus: 30-35,126-131
       node 5 size: 48341 MB
       node 5 free: 47848 MB
       node 6 cpus: 36-41,132-137
       node 6 size: 48375 MB
       node 6 free: 47866 MB
       node 7 cpus: 42-47,138-143
       node 7 size: 48375 MB
       node 7 free: 47822 MB
       node 8 cpus: 48-53,144-149
       node 8 size: 48375 MB
       node 8 free: 47919 MB
       node 9 cpus: 54-59,150-155
       node 9 size: 48375 MB
       node 9 free: 47926 MB
       node 10 cpus: 60-65,156-161
       node 10 size: 48375 MB
       node 10 free: 47949 MB
       node 11 cpus: 66-71,162-167
       node 11 size: 48375 MB
       node 11 free: 47949 MB
       node 12 cpus: 72-77,168-173
       node 12 size: 48375 MB
       node 12 free: 47949 MB
       node 13 cpus: 78-83,174-179
       node 13 size: 48375 MB
       node 13 free: 47948 MB
       node 14 cpus: 84-89,180-185
       node 14 size: 48375 MB
       node 14 free: 47957 MB
       node 15 cpus: 90-95,186-191
       node 15 size: 48177 MB
       node 15 free: 47768 MB
       node distances:
       node   0    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
         0:  10   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32
         1:  11   10   12   12   12   12   12   12   32   32   32   32   32   32   32   32
         2:  12   12   10   11   12   12   12   12   32   32   32   32   32   32   32   32
         3:  12   12   11   10   12   12   12   12   32   32   32   32   32   32   32   32
```

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Platform Notes (Continued)

```
    4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
    5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
    6:  12  12  12  12  12  12  10  11  32  32  32  32  32  32  32  32
    7:  12  12  12  12  12  12  11  10  32  32  32  32  32  32  32  32
    8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
    9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
   10:  32  32  32  32  32  32  32  32  12  12  10  11  12  12  12  12
   11:  32  32  32  32  32  32  32  32  12  12  11  10  12  12  12  12
   12:  32  32  32  32  32  32  32  32  12  12  12  12  10  11  12  12
   13:  32  32  32  32  32  32  32  32  12  12  12  12  11  10  12  12
   14:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
   15:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10


  --------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       792099104 kB


  --------------------------------------------------------------
  10. who -r
     run-level 3 Jan 30 20:15


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

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Platform Notes (Continued)

```
    splash=silent
    mitigations=auto
    quiet
    security=apparmor


    ----------------------------------------------------------
 14. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 1.50 GHz and 3.60 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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Lenovo Global Technology

ThinkSystem SD665 V3
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CPU2017 License: 9017   **Test Date:** Jan-2023
Test Sponsor: Lenovo Global Technology   **Hardware Availability:** Feb-2023
Tested by: Lenovo Global Technology   **Software Availability:** Nov-2022

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 SP4


  ----------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-amd-aocc400-genoa-B1c
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/nvme0n1p3 xfs   3.5T   46G  3.5T   2% /


  ----------------------------------------------------------------
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:
     3x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
     4x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800
     17x Samsung M321R4GA3BB6-CQKVG 32 GB 2 rank 4800



  ----------------------------------------------------------------
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       Lenovo
     BIOS Version:      QGE109D-1.20
     BIOS Date:         01/19/2023
     BIOS Revision:     1.20
     Firmware Revision: 0.90
```

SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

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Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Compiler Version Notes

```
================================================================================
C        | 502.gcc_r(peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
--------------------------------------------------------------------------------


================================================================================
C        | 502.gcc_r(peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
--------------------------------------------------------------------------------


================================================================================
C++      | 523.xalancbmk_r(peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
```

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Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
-------------------------------------------------------------------------


==============================================================================
C++      | 523.xalancbmk_r(peak)
-------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
-------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_r(base, peak)
-------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
-------------------------------------------------------------------------
```

Lenovo Global Technology

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Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Nov-2022

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
-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
```

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Lenovo Global Technology

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Base Optimization Flags (Continued)

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

Fortran benchmarks:
```
flang
```

Peak Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`

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Peak Portability Flags (Continued)

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: `basepeak = yes`

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`

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Peak Optimization Flags (Continued)

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `basepeak = yes`

Fortran benchmarks:

548.exchange2_r: `basepeak = yes`

Peak Other Flags

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

502.gcc_r: `-L/usr/lib32 -Wno-unused-command-line-argument`
`-L/home/work/cpu2017/v118/aocc4/b1/rate/amd_rate_aocc400_genoa_B_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/v118/aocc4/b1/rate/amd_rate_aocc400_genoa_B_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-Q.html
http://www.spec.org/cpu2017/flags/aocc400-flags.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-Q.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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

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