SPEC CPU®2017 Floating Point Rate Result

Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

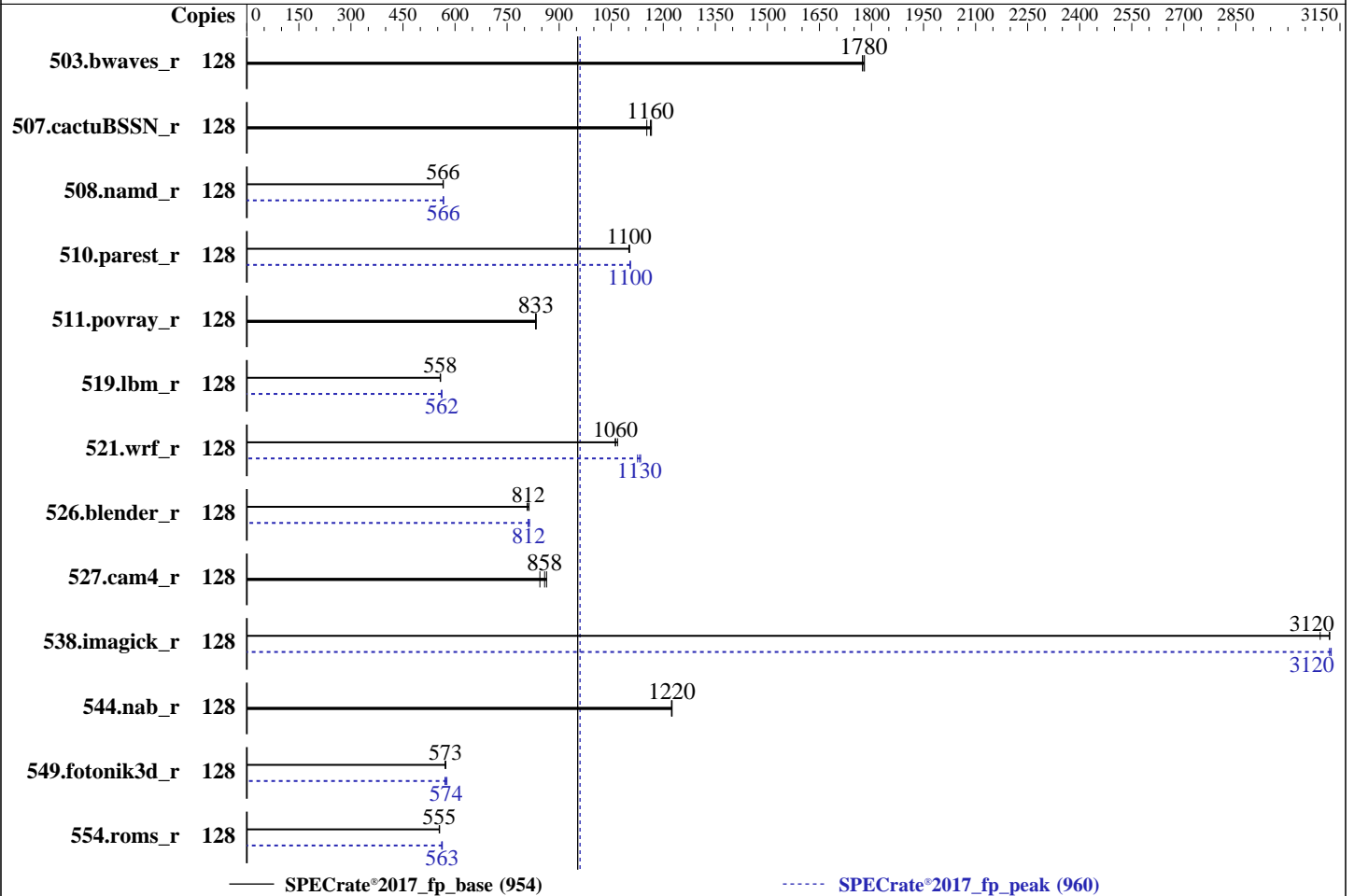SPECrate®2017_fp_peak = 960

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Copies																					
	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3150

- 503.bwaves_r 128 — 1780
- 507.cactuBSSN_r 128 — 1160
- 508.namd_r 128 — 566 / 566
- 510.parest_r 128 — 1100 / 1100
- 511.povray_r 128 — 833
- 519.lbm_r 128 — 558 / 562
- 521.wrf_r 128 — 1060 / 1130
- 526.blender_r 128 — 812 / 812
- 527.cam4_r 128 — 858
- 538.imagick_r 128 — 3120 / 3120
- 544.nab_r 128 — 1220
- 549.fotonik3d_r 128 — 573 / 574
- 554.roms_r 128 — 555 / 563

SPECrate®2017_fp_base (954)
SPECrate®2017_fp_peak (960)

Hardware

CPU Name: AMD EPYC 9384X
 Max MHz: 3900
 Nominal: 3100
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 768 MB I+D on chip per chip,
 96 MB shared / 4 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

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 KAE115K 3.10 released Oct-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 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
503.bwaves_r	128	**722**	**1780**	724	1770	721	1780	128	**722**	**1780**	724	1770	721	1780
507.cactuBSSN_r	128	139	1170	**139**	**1160**	141	1150	128	139	1170	**139**	**1160**	141	1150
508.namd_r	128	**215**	**566**	215	566	215	565	128	**215**	**566**	215	566	215	567
510.parest_r	128	304	1100	**304**	**1100**	304	1100	128	**303**	**1100**	303	1100	303	1110
511.povray_r	128	358	834	**359**	**833**	359	832	128	358	834	**359**	**833**	359	832
519.lbm_r	128	242	558	**242**	**558**	242	557	128	240	562	240	561	**240**	**562**
521.wrf_r	128	**270**	**1060**	268	1070	270	1060	128	255	1130	253	1130	**253**	**1130**
526.blender_r	128	240	813	241	808	**240**	**812**	128	239	815	**240**	**812**	241	810
527.cam4_r	128	265	844	259	864	**261**	**858**	128	265	844	259	864	**261**	**858**
538.imagick_r	128	**102**	**3120**	103	3090	102	3120	128	**102**	**3120**	102	3120	102	3120
544.nab_r	128	**176**	**1220**	176	1220	176	1230	128	**176**	**1220**	176	1220	176	1230
549.fotonik3d_r	128	**871**	**573**	870	573	873	571	128	865	577	**869**	**574**	874	571
554.roms_r	128	366	555	367	554	**367**	**555**	128	361	563	362	561	**362**	**563**
SPECrate®2017_fp_base =		**954**												
SPECrate®2017_fp_peak =		**960**												

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,
```

(Continued on next page)

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Operating System Notes (Continued)

```
'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-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"
```

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 Thu Nov 23 01:02:58 2023

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
 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
```

(Continued on next page)

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Platform Notes (Continued)

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

--------------------------------------------------------------
2. w
   01:02:58 up  8:43,  1 user,  load average: 23.31, 89.82, 112.78
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                16:20    8:40m  1.27s  0.17s /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) 3094646
  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) 3094646
  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_SR665V3_genoa-X_1.02.sh
 /bin/bash ./Run026-compliant-amd-ratefp.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 fprate
 runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.197/templogs/preenv.fprate.197.0.log --lognum 197.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2

--------------------------------------------------------------
6. /proc/cpuinfo
```

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Platform Notes (Continued)

```
    model name       : AMD EPYC 9384X 32-Core Processor
    vendor_id        : AuthenticAMD
    cpu family       : 25
    model            : 17
    stepping         : 2
    microcode        : 0xa10123e
    bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size         : 3584 4K pages
    cpu cores        : 32
    siblings         : 64
    2 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-3,8-11,16-19,24-27,32-35,40-43,48-51,56-59
    physical id 1: core ids 0-3,8-11,16-19,24-27,32-35,40-43,48-51,56-59
    physical id 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119
    physical id 1: apicids 128-135,144-151,160-167,176-183,192-199,208-215,224-231,240-247
  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 9384X 32-Core Processor
    CPU family:             25
    Model:                  17
    Thread(s) per core:     2
    Core(s) per socket:     32
    Socket(s):              2
    Stepping:               2
    Frequency boost:        enabled
    CPU max MHz:            3911.3279
    CPU min MHz:            1500.0000
    BogoMIPS:               6190.64
    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
    L1d cache:              2 MiB (64 instances)
```

(Continued on next page)

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Platform Notes (Continued)

```
  L1i cache:                  2 MiB (64 instances)
  L2 cache:                   64 MiB (64 instances)
  L3 cache:                   1.5 GiB (16 instances)
  NUMA node(s):               8
  NUMA node0 CPU(s):          0-7,64-71
  NUMA node1 CPU(s):          8-15,72-79
  NUMA node2 CPU(s):          16-23,80-87
  NUMA node3 CPU(s):          24-31,88-95
  NUMA node4 CPU(s):          32-39,96-103
  NUMA node5 CPU(s):          40-47,104-111
  NUMA node6 CPU(s):          48-55,112-119
  NUMA node7 CPU(s):          56-63,120-127
  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        96M     1.5G   16 Unified         3 98304        1             64


  ----------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0-7,64-71
  node 0 size: 96462 MB
  node 0 free: 95774 MB
  node 1 cpus: 8-15,72-79
  node 1 size: 96763 MB
  node 1 free: 96146 MB
  node 2 cpus: 16-23,80-87
  node 2 size: 96763 MB
  node 2 free: 96152 MB
  node 3 cpus: 24-31,88-95
  node 3 size: 96729 MB
  node 3 free: 96046 MB
  node 4 cpus: 32-39,96-103
  node 4 size: 96763 MB
  node 4 free: 96111 MB
  node 5 cpus: 40-47,104-111
  node 5 size: 96763 MB
  node 5 free: 96141 MB
  node 6 cpus: 48-55,112-119
  node 6 size: 96763 MB
  node 6 free: 96163 MB
  node 7 cpus: 56-63,120-127
  node 7 size: 96681 MB
  node 7 free: 96072 MB
```

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Platform Notes (Continued)

```
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  12  12  12  32  32  32  32
    1:  12  10  12  12  32  32  32  32
    2:  12  12  10  12  32  32  32  32
    3:  12  12  12  10  32  32  32  32
    4:  32  32  32  32  10  12  12  12
    5:  32  32  32  32  12  10  12  12
    6:  32  32  32  32  12  12  10  12
    7:  32  32  32  32  12  12  12  10

  ------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       792260996 kB


  ------------------------------------------------------------
  10. who -r
    run-level 3 Nov 22 16:20


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


  ------------------------------------------------------------
  12. Services, from systemctl list-unit-files
    STATE            UNIT FILES
    enabled          YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator
                     kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog 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


  ------------------------------------------------------------
  13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
    root=UUID=5c910b1f-682a-4d6d-8760-ecffd555ecb9
    splash=silent
    mitigations=auto
    quiet
    security=apparmor


  ------------------------------------------------------------
  14. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 1.50 GHz and 3.10 GHz.
                      The governor "performance" may decide which speed to use
                      within this range.
      boost state support:
        Supported: yes
        Active: yes
```

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Platform Notes (Continued)

```
          ----------------------------------------------------------
          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
            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 SP5


          ----------------------------------------------------------
          19. 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/md126p3   xfs   442G  25G  417G  6% /


          ----------------------------------------------------------
          20. /sys/devices/virtual/dmi/id
              Vendor:        Lenovo
              Product:       ThinkSystem SR665 V3 MB,Genoa,Kauai,DDR5,Kauai,2U
              Product Family: ThinkSystem
              Serial:        1234567890


          ----------------------------------------------------------
          21. dmidecode
            Additional information from dmidecode 3.4 follows.  WARNING: Use caution when you interpret this section.
```

(Continued on next page)

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Platform Notes (Continued)

```
   The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
   determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
   "DMTF SMBIOS" standard.
   Memory:
     1x SK Hynix HMCG88AEBRA107N 32 GB 2 rank 4800
     23x SK Hynix HMCG88AEBRA168N 32 GB 2 rank 4800


   ------------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:        Lenovo
     BIOS Version:       KAE115K-3.10
     BIOS Date:          10/27/2023
     BIOS Revision:      3.10
     Firmware Revision:  2.30
```

Compiler Version Notes

```
==================================================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_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++             | 508.namd_r(base, peak) 510.parest_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++, C          | 511.povray_r(base, peak) 526.blender_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
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++, C, Fortran | 507.cactuBSSN_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
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
```

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Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

SPECrate®2017_fp_peak = 960

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
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        | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_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, C     | 521.wrf_r(base, peak) 527.cam4_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
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
```

Benchmarks using both Fortran and C:
```
flang clang
```

Benchmarks using both C and C++:
```
clang++ clang
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

SPECrate®2017_fp_peak = 960

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
526.blender_r: `-funsigned-char -DSPEC_LP64`
527.cam4_r: `-DSPEC_CASE_FLAG -DSPEC_LP64`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_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 -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 -lamdalloc -lflang
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang
```

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Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

SPECrate®2017_fp_peak = 960

CPU2017 License: 9017		**Test Date:**	Nov-2023
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Dec-2023
Tested by:	Lenovo Global Technology	**Software Availability:**	Jun-2023

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -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 -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Benchmarks using both C and C++:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Base Other Flags

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

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

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

Lenovo Global Technology

SPECrate®2017_fp_base = 954

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_peak = 960

CPU2017 License: 9017		**Test Date:**	Nov-2023
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Dec-2023
Tested by:	Lenovo Global Technology	**Software Availability:**	Jun-2023

Base Other Flags (Continued)

Benchmarks using both Fortran and C:
`-Wno-unused-command-line-argument`

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:
`-Wno-unused-command-line-argument`

Peak Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

Benchmarks using Fortran, C, and C++:
`clang++ clang flang`

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

```
519.lbm_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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Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

SPECrate®2017_fp_peak = 960

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Peak Optimization Flags (Continued)

519.lbm_r (continued):
```
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

538.imagick_r: Same as 519.lbm_r

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

510.parest_r:
```
-m64 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang
```

554.roms_r:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
```

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Lenovo Global Technology

ThinkSystem SR665 V3
(3.10 GHz, AMD EPYC 9384X)

SPECrate®2017_fp_base = 954

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

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Peak Optimization Flags (Continued)

554.roms_r (continued):
```
-lamdalloc -lflang
```

Benchmarks using both Fortran and C:

521.wrf_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -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 -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `basepeak = yes`

526.blender_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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
-finline-aggressive -mllvm -unroll-threshold=100 -lamdlibm
-lamdalloc
```

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

Peak Other Flags

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

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

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Lenovo Global Technology

ThinkSystem SR665 V3
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SPECrate®2017_fp_base = 954

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Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Nov-2023
Hardware Availability: Dec-2023
Software Availability: Jun-2023

Peak Other Flags (Continued)

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

Benchmarks using both Fortran and C:
```
-Wno-unused-command-line-argument
```

Benchmarks using both C and C++:
```
-Wno-unused-command-line-argument
```

Benchmarks using Fortran, C, and C++:
```
-Wno-unused-command-line-argument
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Genoa-T.html
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Genoa-T.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.xml

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

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