SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445
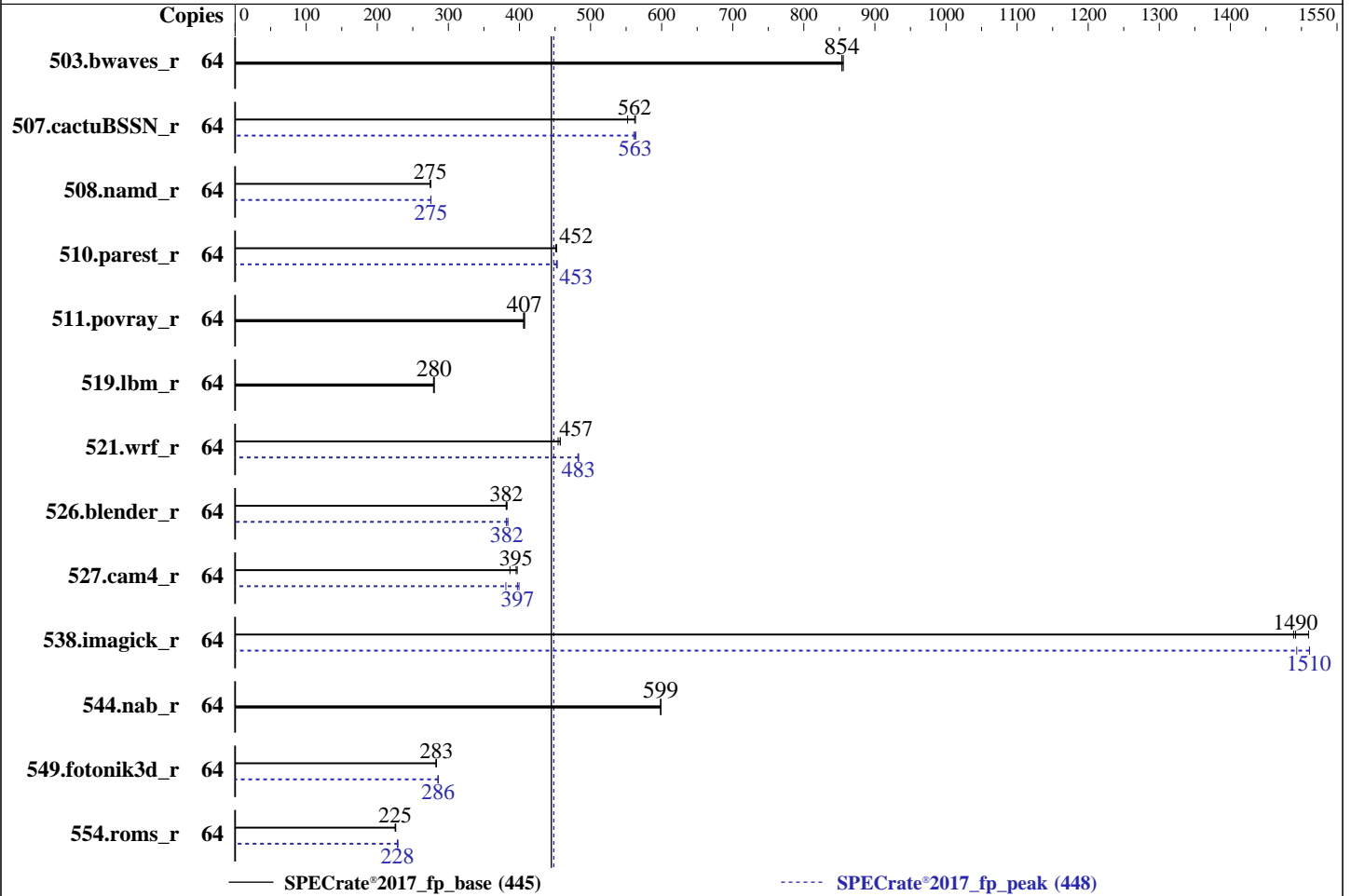
SPECrate®2017_fp_peak = 448

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

Test Date: Mar-2023
Hardware Availability: Apr-2023
Software Availability: Nov-2022

Benchmark	Copies	base	peak
503.bwaves_r	64	854	
507.cactuBSSN_r	64	562	563
508.namd_r	64	275	275
510.parest_r	64	452	453
511.povray_r	64	407	
519.lbm_r	64	280	
521.wrf_r	64	457	483
526.blender_r	64	382	382
527.cam4_r	64	395	397
538.imagick_r	64	1490	1510
544.nab_r	64	599	
549.fotonik3d_r	64	283	286
554.roms_r	64	225	228

SPECrate®2017_fp_base (445)   SPECrate®2017_fp_peak (448)

Hardware

CPU Name: AMD EPYC 9354P
 Max MHz: 3800
 Nominal: 3250
Enabled: 32 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 32 MB shared / 4 cores
 Other: None
Memory: 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA 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 KAE109F 1.40 released Feb-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

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

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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	64	750	856	**752**	**854**	752	853	64	750	856	**752**	**854**	752	853
507.cactuBSSN_r	64	144	563	147	552	**144**	**562**	64	**144**	**563**	144	561	144	564
508.namd_r	64	221	275	**221**	**275**	221	275	64	221	275	**221**	**275**	221	276
510.parest_r	64	371	451	**370**	**452**	370	452	64	370	453	370	452	**370**	**453**
511.povray_r	64	368	406	**367**	**407**	367	407	64	368	406	**367**	**407**	367	407
519.lbm_r	64	242	279	**241**	**280**	241	280	64	242	279	**241**	**280**	241	280
521.wrf_r	64	**313**	**457**	313	458	316	454	64	297	483	**297**	**483**	297	482
526.blender_r	64	255	383	**255**	**382**	256	381	64	254	384	256	381	**255**	**382**
527.cam4_r	64	290	387	**283**	**395**	282	397	64	294	381	280	399	**282**	**397**
538.imagick_r	64	**107**	**1490**	107	1490	105	1510	64	107	1490	105	1510	**105**	**1510**
544.nab_r	64	**180**	**599**	180	599	180	598	64	**180**	**599**	180	599	180	598
549.fotonik3d_r	64	880	283	883	282	**880**	**283**	64	874	285	872	286	**873**	**286**
554.roms_r	64	450	226	451	225	**451**	**225**	64	446	228	444	229	**445**	**228**
SPECrate®2017_fp_base =		**445**												
SPECrate®2017_fp_peak =		**448**												

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.

(Continued on next page)

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Operating System Notes (Continued)

```
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.
```

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-B1e/amd_rate_aocc400_genoa_B_lib/
     lib:/home/cpu2017-1.1.9-amd-aocc400-genoa-B1e/amd_rate_aocc400_genoa_B_l
     ib/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-genoa-B1e/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Wed Mar 15 21:40:53 2023

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

 ------------------------------------------------------------
 Table of contents
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------
     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
       21:40:53 up  4:46,  1 user,  load average: 1.72, 30.96, 50.44
      USER       TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
     root     tty1     -                16:54   4:43m  1.11s  0.08s /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
      scheduling priority             (-e) 0
      file size               (blocks, -f) unlimited
      pending signals                 (-i) 1546735
```

(Continued on next page)

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Test Date: Mar-2023

Hardware Availability: Apr-2023

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Platform Notes (Continued)

```
   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) 1546735
   virtual memory              (kbytes, -v) unlimited
   file locks                          (-x) unlimited


  ----------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 login -- root
 -bash
 /bin/bash ./speccpu_genoa.sh
 /bin/bash ./Run026-compliant-amd-ratefp.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 fprate
 runcpu --configfile amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower --runmode
   rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.137/templogs/preenv.fprate.137.0.log --lognum 137.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-amd-aocc400-genoa-B1e


  ----------------------------------------------------------
6. /proc/cpuinfo
   model name      : AMD EPYC 9354P 32-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       : 32
   siblings        : 64
   1 physical ids (chips)
   64 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 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119
 Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.
```

(Continued on next page)

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Platform Notes (Continued)

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

From lscpu from util-linux 2.37.2:
  Architecture:            x86_64
  CPU op-mode(s):          32-bit, 64-bit
  Address sizes:           52 bits physical, 57 bits virtual
  Byte Order:              Little Endian
  CPU(s):                  64
  On-line CPU(s) list:     0-63
  Vendor ID:               AuthenticAMD
  Model name:              AMD EPYC 9354P 32-Core Processor
  CPU family:              25
  Model:                   17
  Thread(s) per core:      2
  Core(s) per socket:      32
  Socket(s):               1
  Stepping:                1
  Frequency boost:         enabled
  CPU max MHz:             3799.0720
  CPU min MHz:             1500.0000
  BogoMIPS:                6490.49
  Flags:                    fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                           clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
                           constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf rapl
                           pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
                           popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
                           abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext
                           perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3
                           invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1
                           avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
                           avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
                           xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                           avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
                           svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                           pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                           umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                           avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
  Virtualization:          AMD-V
  L1d cache:               1 MiB (32 instances)
  L1i cache:               1 MiB (32 instances)
  L2 cache:                32 MiB (32 instances)
  L3 cache:                256 MiB (8 instances)
  NUMA node(s):            4
  NUMA node0 CPU(s):       0-7,32-39
  NUMA node1 CPU(s):       8-15,40-47
  NUMA node2 CPU(s):       16-23,48-55
```

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Platform Notes (Continued)

```
   NUMA node3 CPU(s):              24-31,56-63
   Vulnerability Itlb multihit:    Not affected
   Vulnerability L1tf:             Not affected
   Vulnerability Mds:              Not affected
   Vulnerability Meltdown:         Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
  Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:        Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                   filling
   Vulnerability Srbds:            Not affected
   Vulnerability Tsx async abort:  Not affected


 From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       1M   8 Data            1     64       1              64
      L1i       32K       1M   8 Instruction     1     64       1              64
      L2         1M      32M   8 Unified         2   2048       1              64
      L3        32M     256M  16 Unified         3  32768       1              64


  ----------------------------------------------------------------
 8. numactl --hardware
 NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0-7,32-39
   node 0 size: 96483 MB
   node 0 free: 95788 MB
   node 1 cpus: 8-15,40-47
   node 1 size: 96763 MB
   node 1 free: 96326 MB
   node 2 cpus: 16-23,48-55
   node 2 size: 96763 MB
   node 2 free: 96318 MB
   node 3 cpus: 24-31,56-63
   node 3 size: 96696 MB
   node 3 free: 95924 MB
   node distances:
   node   0   1   2   3
     0:  10  12  12  12
     1:  12  10  12  12
     2:  12  12  10  12
     3:  12  12  12  10


  ----------------------------------------------------------------
 9. /proc/meminfo
   MemTotal:       395988852 kB


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

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Platform Notes (Continued)

```
 10. who -r
   run-level 3 Mar 15 16:54


  ----------------------------------------------------------------
 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 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 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
   generated         ntp_sync
   indirect          wickedd


  ----------------------------------------------------------------
 13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=b688f3c1-4135-48b5-a7b5-149c36a17cd9
   splash=silent
   mitigations=auto
   quiet
   security=apparmor


  ----------------------------------------------------------------
 14. cpupower frequency-info
   analyzing CPU 0:
     current policy: frequency should be within 1.50 GHz and 3.25 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
```

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Platform Notes (Continued)

```
   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 SP4


   ----------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-amd-aocc400-genoa-B1e
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda3       xfs   446G   54G  392G  13% /
```

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Platform Notes (Continued)

```
   ----------------------------------------------------------------
   20. /sys/devices/virtual/dmi/id
       Vendor:          Lenovo
       Product:         ThinkSystem SR655V3
       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:
        11x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
        1x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800


   ----------------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:        Lenovo
      BIOS Version:       KAE109F-1.40
      BIOS Date:          02/27/2023
      BIOS Revision:      1.40
      Firmware Revision: 1.40
```

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#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++                | 508.namd_r(base, peak) 510.parest_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
```

(Continued on next page)

Lenovo Global Technology

SPECrate®2017_fp_base = 445

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_peak = 448

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

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#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
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++, C, Fortran | 507.cactuBSSN_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
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
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         | 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#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
```

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

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

Compiler Version Notes (Continued)

```
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#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
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
--------------------------------------------------------------------------
```

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`

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

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

Base Portability Flags (Continued)

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
```

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
```

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Mar-2023

Hardware Availability: Apr-2023

Software Availability: Nov-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-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
```

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

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Lenovo Global Technology

SPECrate®2017_fp_base = 445

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_peak = 448

CPU2017 License: 9017
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Tested by: Lenovo Global Technology

Test Date: Mar-2023
Hardware Availability: Apr-2023
Software Availability: Nov-2022

Base Other Flags (Continued)

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: basepeak = yes

538.imagick_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

CPU2017 License: 9017

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Tested by: Lenovo Global Technology

Test Date: Mar-2023

Hardware Availability: Apr-2023

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

538.imagick_r (continued):
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -lamdlibm`
`-lamdalloc`

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`
`-lamdalloc -lflang`

Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

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

Test Date: Mar-2023
Hardware Availability: Apr-2023
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

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: -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 -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++:

```
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++:
```
-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
```

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Lenovo Global Technology

ThinkSystem SR655 V3
(3.25 GHz,AMD EPYC 9354P)

SPECrate®2017_fp_base = 445

SPECrate®2017_fp_peak = 448

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

Test Date: Mar-2023
Hardware Availability: Apr-2023
Software Availability: Nov-2022

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -faggressive-loop-transform -fvector-transform
-fscalar-transform -Mrecursive -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang
```

Peak Other Flags

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

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

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-R.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-R.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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