SPEC CPU®2017 Floating Point Rate Result

Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030
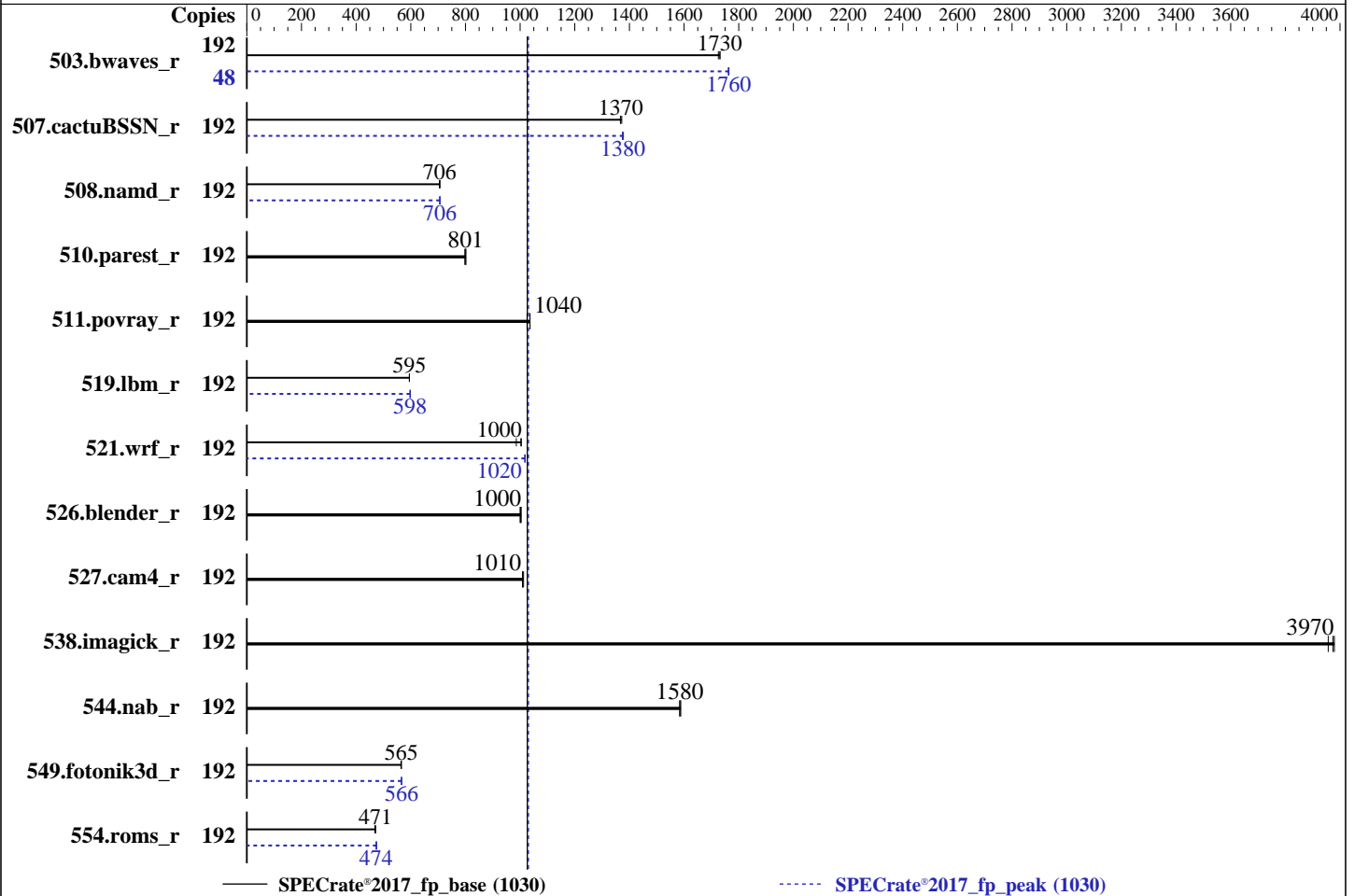
SPECrate®2017_fp_peak = 1030

CPU2017 License: 9017　　　　　　　　　　　　　　　　**Test Date:** Jun-2024
Test Sponsor: Lenovo Global Technology　　　　　　**Hardware Availability:** May-2024
Tested by: Lenovo Global Technology　　　　　　　**Software Availability:** May-2024

Copies			
503.bwaves_r	192	1730	
	48	1760	
507.cactuBSSN_r	192	1370	
		1380	
508.namd_r	192	706	
		706	
510.parest_r	192	801	
511.povray_r	192	1040	
519.lbm_r	192	595	
		598	
521.wrf_r	192	1000	
		1020	
526.blender_r	192	1000	
527.cam4_r	192	1010	
538.imagick_r	192	3970	
544.nab_r	192	1580	
549.fotonik3d_r	192	565	
		566	
554.roms_r	192	471	
		474	

—— SPECrate®2017_fp_base (1030)　　　　········ SPECrate®2017_fp_peak (1030)

Hardware

CPU Name: AMD EPYC 9454
　Max MHz: 3800
　Nominal: 2750
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: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 3.2 TB NVME SSD
Other: CPU Cooling: Air

Software

OS: Ubuntu 22.04.4 LTS
　　　Kernel 5.15.0-112-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Lenovo BIOS Version R5E101H 1.10 released May-2024
File System: ext4
System State: Run level 5 (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	192	1112	1730	**1112**	**1730**	1116	1730	48	**273**	**1760**	273	1760	273	1760
507.cactuBSSN_r	192	**178**	**1370**	178	1370	177	1370	192	176	1380	**177**	**1380**	177	1370
508.namd_r	192	**258**	**706**	258	706	259	705	192	**258**	**706**	258	707	258	706
510.parest_r	192	627	801	630	798	**627**	**801**	192	627	801	630	798	**627**	**801**
511.povray_r	192	433	1040	**433**	**1040**	437	1030	192	433	1040	**433**	**1040**	437	1030
519.lbm_r	192	340	595	**340**	**595**	340	595	192	**338**	**598**	338	598	339	597
521.wrf_r	192	428	1000	436	986	**429**	**1000**	192	**423**	**1020**	422	1020	423	1020
526.blender_r	192	292	1000	291	1000	**292**	**1000**	192	292	1000	291	1000	**292**	**1000**
527.cam4_r	192	333	1010	**333**	**1010**	332	1010	192	333	1010	**333**	**1010**	332	1010
538.imagick_r	192	121	3960	**120**	**3970**	120	3980	192	121	3960	**120**	**3970**	120	3980
544.nab_r	192	204	1580	**204**	**1580**	204	1590	192	204	1580	**204**	**1580**	204	1590
549.fotonik3d_r	192	**1324**	**565**	1327	564	1323	566	192	1323	566	1321	566	**1322**	**566**
554.roms_r	192	651	469	**648**	**471**	648	471	192	645	473	**644**	**474**	642	475

SPECrate®2017_fp_base =	**1030**
SPECrate®2017_fp_peak =	**1030**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

```
The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/
```

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

cpupower set to performance mode
```

(Continued on next page)

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Test Date: Jun-2024

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Operating System Notes (Continued)

```
cpupower frequency-set -r -g performance
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 =
     "/speccpu/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/amd_rate_aocc400_znver4_A_lib/lib:/speccpu/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
NUMA Nodes per Socket set to NPS4

 Sysinfo program /speccpu/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on ubuntu2204 Fri Jun 14 02:32:24 2024

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

 -----------------------------------------------------------
 Table of contents
 -----------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
```

(Continued on next page)

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Platform Notes (Continued)

```
 15. cpupower frequency-info
 16. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
 ------------------------------------------------------------


 ------------------------------------------------------------
 1. uname -a
   Linux ubuntu2204 5.15.0-112-generic #122-Ubuntu SMP Thu May 23 07:48:21 UTC 2024 x86_64 x86_64 x86_64
   GNU/Linux


 ------------------------------------------------------------
 2. w
    02:32:24 up 20 min,  2 users,  load average: 0.16, 0.04, 0.01
   USER      TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   spv       tty1     -                02:17   14:56   0.28s  0.00s -bash
   spv       pts/0    -                02:17   14.00s  1.30s  0.27s sudo -i


 ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root
   From the command 'logname':       spv


 ------------------------------------------------------------
 4. ulimit -a
   time(seconds)        unlimited
   file(blocks)         unlimited
   data(kbytes)         unlimited
   stack(kbytes)        unlimited
   coredump(blocks)     0
   memory(kbytes)       unlimited
   locked memory(kbytes) 2097152
   process              6190873
   nofiles              1024
   vmemory(kbytes)      unlimited
   locks                unlimited
   rtprio               0


 ------------------------------------------------------------
 5. sysinfo process ancestry
  /sbin/init
  /bin/login -p --
  -bash
  sudo -i
  sudo -i
  -bash
  /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/CPU2017.006/templogs/preenv.fprate.006.0.log --lognum 006.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
  $SPEC = /speccpu/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
```

(Continued on next page)

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Platform Notes (Continued)

```
    ----------------------------------------------------------
 6. /proc/cpuinfo
     model name      : AMD EPYC 9454 48-Core Processor
     vendor_id       : AuthenticAMD
     cpu family      : 25
     model           : 17
     stepping        : 1
     microcode       : 0xa101144
     bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
     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
     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 9454 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:           3810.7910
   CPU min MHz:           1500.0000
   BogoMIPS:              5491.58
   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 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
```

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Platform Notes (Continued)

```
                                      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)
  L3 cache:                           512 MiB (16 instances)
  NUMA node(s):                       8
  NUMA node0 CPU(s):                  0-11,96-107
  NUMA node1 CPU(s):                  12-23,108-119
  NUMA node2 CPU(s):                  24-35,120-131
  NUMA node3 CPU(s):                  36-47,132-143
  NUMA node4 CPU(s):                  48-59,144-155
  NUMA node5 CPU(s):                  60-71,156-167
  NUMA node6 CPU(s):                  72-83,168-179
  NUMA node7 CPU(s):                  84-95,180-191
  Vulnerability Gather data sampling: Not affected
  Vulnerability Itlb multihit:        Not affected
  Vulnerability L1tf:                 Not affected
  Vulnerability Mds:                  Not affected
  Vulnerability Meltdown:             Not affected
  Vulnerability Mmio stale data:      Not affected
  Vulnerability Retbleed:             Not affected
  Vulnerability Spec rstack overflow: Mitigation; safe RET
  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; BHI Not affected
  Vulnerability Srbds:                Not affected
  Vulnerability Tsx async abort:      Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       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: 8 nodes (0-7)
  node 0 cpus: 0-11,96-107
  node 0 size: 193221 MB
  node 0 free: 192465 MB
  node 1 cpus: 12-23,108-119
  node 1 size: 193529 MB
  node 1 free: 192907 MB
  node 2 cpus: 24-35,120-131
  node 2 size: 193529 MB
  node 2 free: 192966 MB
  node 3 cpus: 36-47,132-143
  node 3 size: 193482 MB
  node 3 free: 192942 MB
  node 4 cpus: 48-59,144-155
  node 4 size: 193529 MB
  node 4 free: 192982 MB
  node 5 cpus: 60-71,156-167
  node 5 size: 193529 MB
  node 5 free: 192928 MB
  node 6 cpus: 72-83,168-179
```

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Platform Notes (Continued)

```
   node 6 size: 193529 MB
   node 6 free: 192958 MB
   node 7 cpus: 84-95,180-191
   node 7 size: 193478 MB
   node 7 free: 192911 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  20  20  20  20  20  20  20
     1:  20  10  20  20  20  20  20  20
     2:  20  20  10  20  20  20  20  20
     3:  20  20  20  10  20  20  20  20
     4:  20  20  20  20  10  20  20  20
     5:  20  20  20  20  20  10  20  20
     6:  20  20  20  20  20  20  10  20
     7:  20  20  20  20  20  20  20  10


   ------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1584980440 kB


   ------------------------------------------------------------
10. who -r
   run-level 5 Jun 14 02:14


   ------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
   Default Target  Status
   graphical       degraded


   ------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
      UNIT                            LOAD   ACTIVE SUB    DESCRIPTION
    * systemd-networkd-wait-online.service loaded failed failed Wait for Network to be Configured


   ------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         ModemManager apparmor blk-availability cloud-config cloud-final cloud-init
                   cloud-init-local console-setup cron dmesg e2scrub_reap finalrd getty@ gpu-manager
                   grub-common grub-initrd-fallback irqbalance keyboard-setup lvm2-monitor lxd-agent
                   multipathd networkd-dispatcher open-iscsi open-vm-tools pollinate rsyslog secureboot-db
                   setvtrgb snapd ssh systemd-networkd systemd-networkd-wait-online systemd-pstore
                   systemd-resolved systemd-timesyncd thermald ua-reboot-cmds ubuntu-advantage udisks2 ufw
                   unattended-upgrades vgauth
   enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
   disabled        console-getty debug-shell ipmievd iscsid nftables rsync serial-getty@
                   systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                   systemd-time-wait-sync upower
   generated       apport openipmi
   indirect        uuidd
   masked          cryptdisks cryptdisks-early hwclock lvm2 multipath-tools-boot rc rcS screen-cleanup sudo
                   x11-common

   ------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.15.0-112-generic
   root=UUID=e2a91883-1e50-4c69-bb19-9d905b1b613e
   ro

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

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Platform Notes (Continued)

```
  15. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 1.50 GHz and 2.75 GHz.
                      The governor "performance" may decide which speed to use
                      within this range.
      boost state support:
        Supported: yes
        Active: yes
        Boost States: 0
        Total States: 3
        Pstate-P0:  2750MHz


  ----------------------------------------------------------------
  16. sysctl
    kernel.numa_balancing            1
    kernel.randomize_va_space        0
    vm.compaction_proactiveness      20
    vm.dirty_background_bytes         0
    vm.dirty_background_ratio        10
    vm.dirty_bytes                    0
    vm.dirty_expire_centisecs      3000
    vm.dirty_ratio                    8
    vm.dirty_writeback_centisecs    500
    vm.dirtytime_expire_seconds   43200
    vm.extfrag_threshold            500
    vm.min_unmapped_ratio             1
    vm.nr_hugepages                   0
    vm.nr_hugepages_mempolicy         0
    vm.nr_overcommit_hugepages        0
    vm.swappiness                     1
    vm.watermark_boost_factor     15000
    vm.watermark_scale_factor        10
    vm.zone_reclaim_mode              1


  ----------------------------------------------------------------
  17. /sys/kernel/mm/transparent_hugepage
    defrag          [always] defer defer+madvise madvise never
    enabled         [always] madvise never
    hpage_pmd_size  2097152
    shmem_enabled   always within_size advise [never] deny force


  ----------------------------------------------------------------
  18. /sys/kernel/mm/transparent_hugepage/khugepaged
    alloc_sleep_millisecs   60000
    defrag                      1
    max_ptes_none             511
    max_ptes_shared           256
    max_ptes_swap              64
    pages_to_scan            4096
    scan_sleep_millisecs    10000


  ----------------------------------------------------------------
  19. OS release
    From /etc/*-release /etc/*-version
    os-release Ubuntu 22.04.4 LTS


  ----------------------------------------------------------------
  20. Disk information
  SPEC is set to: /speccpu/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
    Filesystem      Type  Size  Used Avail Use% Mounted on
```

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Platform Notes (Continued)

```
   /dev/nvme1n1p2 ext4  2.9T   25G  2.7T   1% /


   ----------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:           Lenovo
    Product:          ThinkSystem SR685a V3 System Board
    Product Family:   ThinkSystem
    Serial:           None


   ----------------------------------------------------------------
22. dmidecode
   Additional information from dmidecode 3.3 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:
     24x SK Hynix HMCG94MEBRA121N 64 GB 2 rank 4800


   ----------------------------------------------------------------
23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:      Lenovo
    BIOS Version:     R5E101H-1.10
    BIOS Date:        05/09/2024
    BIOS Revision:    1.10
    Firmware Revision: 1.10
```

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
```

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Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030

SPECrate®2017_fp_peak = 1030

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

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

Compiler Version Notes (Continued)

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

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

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Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030

SPECrate®2017_fp_peak = 1030

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jun-2024

Hardware Availability: May-2024

Software Availability: May-2024

Base Compiler Invocation (Continued)

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`
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
```

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Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030

SPECrate®2017_fp_peak = 1030

Base Optimization Flags (Continued)

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

SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030

SPECrate®2017_fp_peak = 1030

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

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

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
```

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
```

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

Lenovo Global Technology

ThinkSystem SR685a V3
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Software Availability: May-2024

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
-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: basepeak = yes
```

```
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: basepeak = yes
```

Fortran benchmarks:

```
503.bwaves_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
```

```
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
```

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Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

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

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

Peak Optimization Flags (Continued)

554.roms_r: Same as 503.bwaves_r

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: basepeak = yes

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
-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

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR685a V3
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1030

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CPU2017 License: 9017   **Test Date:**   Jun-2024
Test Sponsor: Lenovo Global Technology   **Hardware Availability:** May-2024
Tested by: Lenovo Global Technology   **Software Availability:** May-2024

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

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

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

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