SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

ThinkEdge SE455 V3
(2.45 GHz, AMD EPYC 8124P)

$SPECspeed^{®}2017\_fp\_base = 117$

$SPECspeed^{®}2017\_fp\_peak = 126$

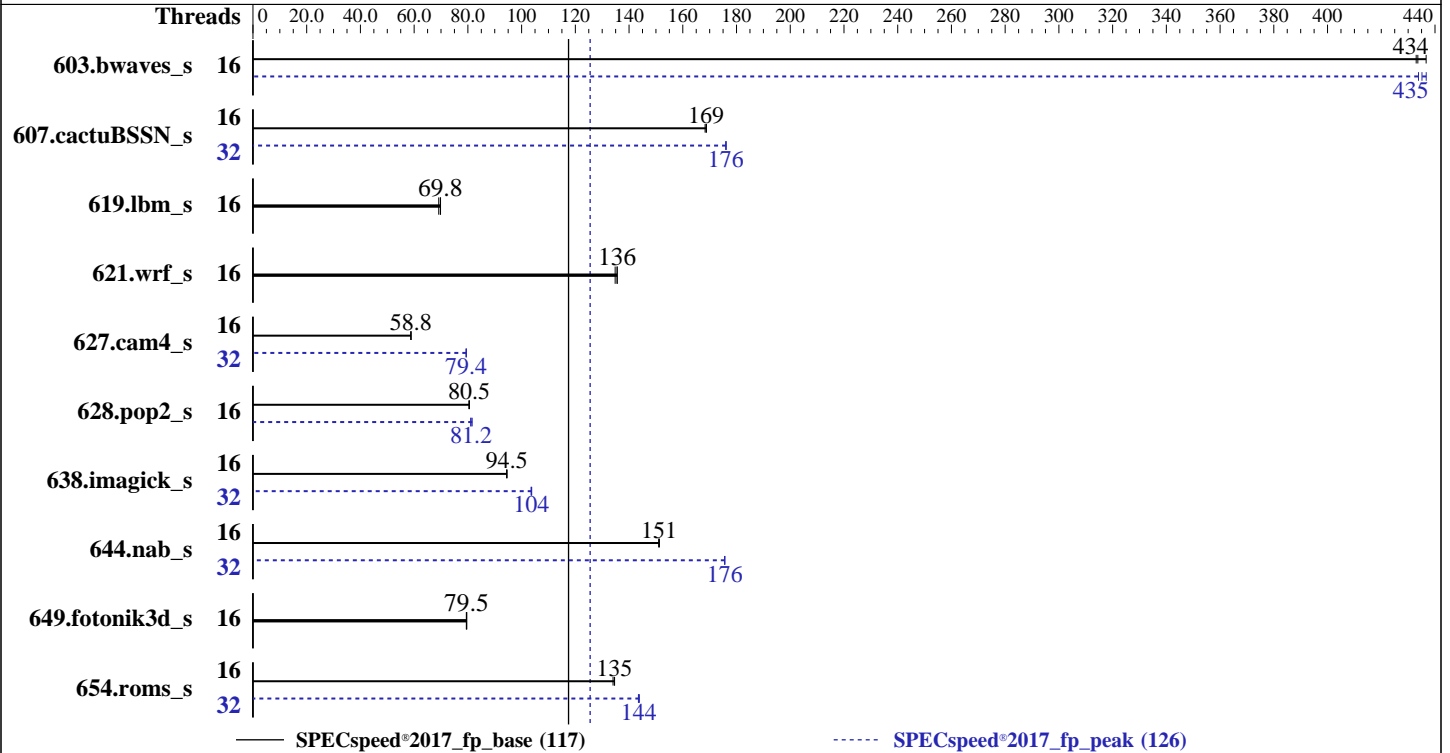**CPU2017 License:** 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Threads			
603.bwaves_s	16		434
			435
607.cactuBSSN_s	16	169	
	32	176	
619.lbm_s	16	69.8	
621.wrf_s	16	136	
627.cam4_s	16	58.8	
	32	79.4	
628.pop2_s	16	80.5	
	32	81.2	
638.imagick_s	16	94.5	
	32	104	
644.nab_s	16	151	
	32	176	
649.fotonik3d_s	16	79.5	
654.roms_s	16	135	
	32	144	

—— SPECspeed®2017_fp_base (117)   - - - - SPECspeed®2017_fp_peak (126)

Hardware

CPU Name: AMD EPYC 8124P
 Max MHz: 3000
 Nominal: 2450
Enabled: 16 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: 64 MB I+D on chip per chip,
 16 MB shared / 4 cores
 Other: None
Memory: 192 GB (6 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB M.2 NVME SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 Kernel 5.14.21-150400.22-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: Yes
Firmware: Lenovo BIOS Version MBE103I 1.10 released Sep-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

	Base						Peak					
Benchmark	**Threads**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Threads**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
603.bwaves_s	16	136	433	**136**	**434**	135	437	16	136	434	**136**	**435**	135	437
607.cactuBSSN_s	16	**98.8**	**169**	98.7	169	99.0	168	32	94.7	176	94.7	176	**94.7**	**176**
619.lbm_s	16	75.0	69.8	**75.1**	**69.8**	75.7	69.2	16	75.0	69.8	**75.1**	**69.8**	75.7	69.2
621.wrf_s	16	98.1	135	**97.6**	**136**	97.6	136	16	98.1	135	**97.6**	**136**	97.6	136
627.cam4_s	16	151	58.8	151	58.8	**151**	**58.8**	32	112	79.4	**112**	**79.4**	112	79.4
628.pop2_s	16	147	80.5	**147**	**80.5**	148	80.4	16	**146**	**81.2**	147	81.0	145	81.6
638.imagick_s	16	**153**	**94.5**	153	94.5	153	94.5	32	139	104	139	104	**139**	**104**
644.nab_s	16	116	151	**116**	**151**	115	151	32	**99.5**	**176**	99.5	176	99.5	176
649.fotonik3d_s	16	**115**	**79.5**	115	79.6	115	79.4	16	**115**	**79.5**	115	79.6	115	79.4
654.roms_s	16	**117**	**135**	117	134	117	135	32	109	144	110	143	**110**	**144**
SPECspeed®2017_fp_base =	**117**											
SPECspeed®2017_fp_peak =	**126**											

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

Compiler Notes

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

Submit Notes

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

Operating System Notes

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

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

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

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.

(Continued on next page)

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Operating System Notes (Continued)

```
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-31"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/amd_speed_aocc400_znver4_A_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "32"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"
```

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.
```

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Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA Nodes per Socket set to NPS2

Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Nov 15 06:04:55 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 (249.11+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
   06:04:55 up 5 days, 13:09,  1 user,  load average: 4.84, 5.74, 3.44
  USER     TTY        FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1       -                29Apr22 19:42m  1.43s  0.16s /bin/bash ./amd_speed_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) 771850
  max locked memory       (kbytes, -l) 2097152
```

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Platform Notes (Continued)

```
   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) 771850
   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 ./Run034-compliant-amd-speed.sh
 python3 ./run_amd_speed_aocc400_znver4_A1.py
 /bin/bash ./amd_speed_aocc400_znver4_A1.sh
 runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fpspeed
 runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.078/templogs/preenv.fpspeed.078.0.log --lognum 078.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2

    ------------------------------------------------------------
 6. /proc/cpuinfo
    model name      : AMD EPYC 8124P 16-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 160
    stepping        : 2
    microcode       : 0xaa00212
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size        : 3584 4K pages
    cpu cores       : 16
    siblings        : 32
    1 physical ids (chips)
    32 processors (hardware threads)
    physical id 0: core ids 0-3,8-11,16-19,24-27
    physical id 0: apicids 0-7,16-23,32-39,48-55
  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):                  32
  On-line CPU(s) list:     0-31
  Vendor ID:               AuthenticAMD
  Model name:              AMD EPYC 8124P 16-Core Processor
  CPU family:              25
  Model:                   160
  Thread(s) per core:      2
```

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Platform Notes (Continued)

```
    Core(s) per socket:         16
    Socket(s):                  1
    Stepping:                   2
    Frequency boost:            enabled
    CPU max MHz:                3002.6851
    CPU min MHz:                1500.0000
    BogoMIPS:                   4892.31
    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:                  512 KiB (16 instances)
    L1i cache:                  512 KiB (16 instances)
    L2 cache:                   16 MiB (16 instances)
    L3 cache:                   64 MiB (4 instances)
    NUMA node(s):               1
    NUMA node0 CPU(s):          0-31
    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     512K   8 Data              1     64        1             64
      L1i       32K     512K   8 Instruction       1     64        1             64
      L2         1M      16M   8 Unified           2   2048        1             64
      L3        16M      64M  16 Unified           3  16384        1             64

  ---------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
    node 0 cpus: 0-31
    node 0 size: 192986 MB
    node 0 free: 192203 MB
    node distances:
    node   0
      0:  10

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

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Platform Notes (Continued)

```
   9. /proc/meminfo
      MemTotal:       197618296 kB


   -------------------------------------------------------------
   10. who -r
     run-level 3 Apr 29 20:00


   -------------------------------------------------------------
   11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
     Default Target  Status
     multi-user      running


   -------------------------------------------------------------
   12. Services, from systemctl list-unit-files
      STATE            UNIT FILES
      enabled          YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
                       issue-generator kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections postfix
                       purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4
                       wickedd-dhcp6 wickedd-nanny
      enabled-runtime  systemd-remount-fs
      disabled         autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                       chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                       firewalld gpm grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd
                       issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap
                       nvmf-autoconnect rdisc rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts
                       snmpd snmptrapd systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                       systemd-time-wait-sync systemd-timesyncd
      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=16cfcc2a-78c0-4035-9fc3-1137fe6f296c
      splash=silent
      mitigations=auto
      quiet
      security=apparmor


   -------------------------------------------------------------
   14. cpupower frequency-info
      analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 2.45 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            0
     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
```

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Platform Notes (Continued)

```
     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-znver4-A1.2
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/nvme0n1p2 xfs    447G   43G  405G  10% /


   ----------------------------------------------------------
20. /sys/devices/virtual/dmi/id
     Vendor:         Lenovo
     Product:        ThinkEdge SE455 V3 Planar
     Product Family: ThinkSystem
     Serial:         1234567890


   ----------------------------------------------------------
21. dmidecode
   Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
   The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
   determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
   "DMTF SMBIOS" standard.
   Memory:
     3x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
     2x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
     1x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800



   ----------------------------------------------------------
22. BIOS
```

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Platform Notes (Continued)

```
    (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:       Lenovo
      BIOS Version:      MBE103I-1.10
      BIOS Date:         09/07/2023
      BIOS Revision:     1.10
      Firmware Revision: 1.10
```

Compiler Version Notes

```
==============================================================================
C                | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(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, Fortran | 607.cactuBSSN_s(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          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(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       | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(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
------------------------------------------------------------------------------
```

Lenovo Global Technology

ThinkEdge SE455 V3
(2.45 GHz, AMD EPYC 8124P)

SPECspeed®2017_fp_base = 117

SPECspeed®2017_fp_peak = 126

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

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

Base Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

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

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

Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`
621.wrf_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
627.cam4_s: `-DSPEC_CASE_FLAG -DSPEC_LP64`
628.pop2_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
638.imagick_s: `-DSPEC_LP64`
644.nab_s: `-DSPEC_LP64`
649.fotonik3d_s: `-DSPEC_LP64`
654.roms_s: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
```

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Tested by:	Lenovo Global Technology	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
-lamdlibm -lamdalloc -lflang
```

Benchmarks using both Fortran and C:
```
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Base Other Flags

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

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

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

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

SPEC CPU®2017 Floating Point Speed Result

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Peak Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

644.nab_s: -m64 -Wl,-mllvm -Wl,-region-vectorize -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Fortran benchmarks:

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Peak Optimization Flags (Continued)

603.bwaves_s: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP`
`-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fopenmp -Mrecursive -mllvm -reduce-array-computations=3`
`-fvector-transform -fscalar-transform -fopenmp=libomp`
`-lomp -lamdlibm -lamdalloc -lflang`

649.fotonik3d_s: `basepeak = yes`

654.roms_s: `Same as 603.bwaves_s`

Benchmarks using both Fortran and C:

621.wrf_s: `basepeak = yes`

627.cam4_s: `-m64 -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 -fopenmp`
`-flto -fstruct-layout=9 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
`-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc`
`-lflang`

628.pop2_s: `-m64 -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 -fopenmp`
`-flto -fstruct-layout=9 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
`-Mrecursive -fvector-transform -fscalar-transform`
`-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang`

Benchmarks using Fortran, C, and C++:
`-m64 -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 -fopenmp -flto -fstruct-layout=9`
`-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3`
`-DSPEC_OPENMP -zopt -finline-aggressive -mllvm -unroll-threshold=100`

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Peak Other Flags

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

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

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

Benchmarks using Fortran, C, and C++:
```
-Wno-return-type -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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