SPEC CPU®2017 Floating Point Rate Result

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Fusionstor
(Test Sponsor: Meganet)
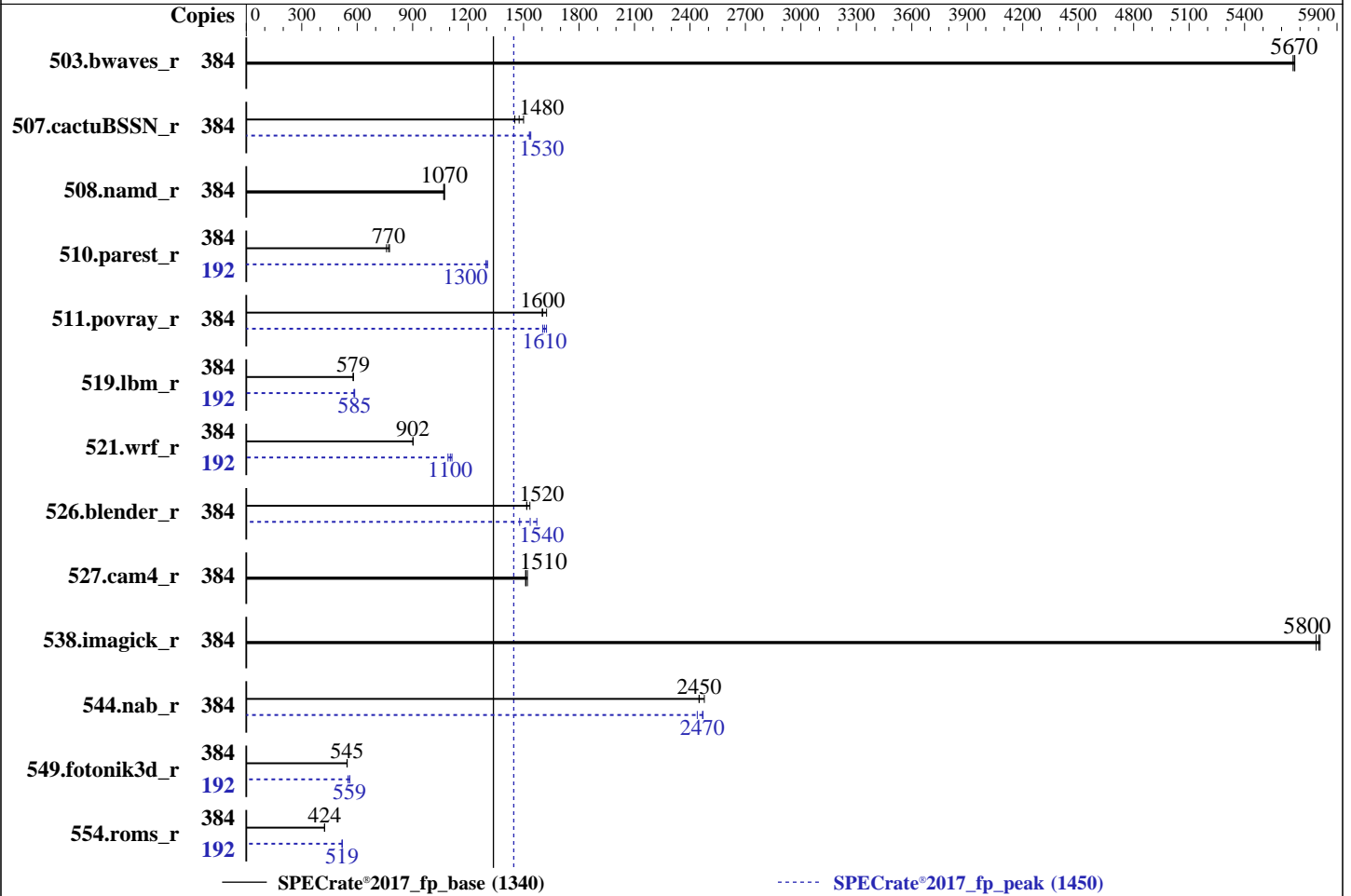
Invento i6000 EPYC (AMD EPYC 9654)

$SPECrate^{®}2017\_fp\_base = 1340$

$SPECrate^{®}2017\_fp\_peak = 1450$

CPU2017 License: 6221
Test Sponsor: Meganet
Tested by: Fusionstor system

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

Benchmark	Copies	base	peak
503.bwaves_r	384	5670	
507.cactuBSSN_r	384	1480	1530
508.namd_r	384	1070	
510.parest_r	384 / 192	770	1300
511.povray_r	384	1600	1610
519.lbm_r	384 / 192	579	585
521.wrf_r	384 / 192	902	1100
526.blender_r	384	1520	1540
527.cam4_r	384	1510	
538.imagick_r	384	5800	
544.nab_r	384	2450	2470
549.fotonik3d_r	384 / 192	545	559
554.roms_r	384 / 192	424	519

SPECrate®2017_fp_base (1340) ——— SPECrate®2017_fp_peak (1450) - - -

Hardware

CPU Name: AMD EPYC 9654
 Max MHz: 3700
 Nominal: 2400
Enabled: 192 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC5-5600B-R, running at 4800)
Storage: 960 GB SATA SSD
Other: CPU Cooling: Air

Software

OS: Ubuntu 22.04.5 LTS
 kernel version
 6.8.0-51-generic
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
Parallel: No
Firmware: Version 5.27 released Nov-2024
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: OS set to prefer performance at the expense of additional power usage

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Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	384	**_679_**	**_5670_**	679	5670	680	5660	384	**_679_**	**_5670_**	679	5670	680	5660
507.cactuBSSN_r	384	**_329_**	**_1480_**	324	1500	335	1450	384	318	1530	316	1540	**_317_**	**_1530_**
508.namd_r	384	**_341_**	**_1070_**	340	1070	342	1070	384	**_341_**	**_1070_**	340	1070	342	1070
510.parest_r	384	1296	775	**_1305_**	**_770_**	1324	758	192	385	1310	**_387_**	**_1300_**	387	1300
511.povray_r	384	**_559_**	**_1600_**	560	1600	552	1620	384	552	1620	559	1600	**_556_**	**_1610_**
519.lbm_r	384	700	578	698	580	**_699_**	**_579_**	192	345	586	348	582	**_346_**	**_585_**
521.wrf_r	384	954	901	953	903	**_954_**	**_902_**	192	387	1110	**_390_**	**_1100_**	394	1090
526.blender_r	384	381	1530	**_385_**	**_1520_**	386	1520	384	395	1480	372	1570	**_381_**	**_1540_**
527.cam4_r	384	**_444_**	**_1510_**	442	1520	445	1510	384	**_444_**	**_1510_**	442	1520	445	1510
538.imagick_r	384	**_165_**	**_5800_**	164	5810	165	5790	384	**_165_**	**_5800_**	164	5810	165	5790
544.nab_r	384	264	2450	261	2480	**_264_**	**_2450_**	384	**_262_**	**_2470_**	265	2440	262	2470
549.fotonik3d_r	384	2747	545	2740	546	**_2746_**	**_545_**	192	1337	560	**_1338_**	**_559_**	1359	550
554.roms_r	384	1442	423	1439	424	**_1439_**	**_424_**	192	588	519	588	518	**_588_**	**_519_**

SPECrate®2017_fp_base = 1340

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

Compiler Notes

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

Submit Notes

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

Operating System Notes

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

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

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

To enable Transparent Hugepages (THP) for all allocations,
```

(Continued on next page)

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

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Operating System Notes (Continued)

```
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "/home/speccpu/cpu2017/amd_rate_aocc500_znver5_A_lib/lib:/home/speccpu/cpu2017/amd_rate_aocc500_znver5
    _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
```

Platform Notes

```
 Sysinfo program /home/speccpu/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on AMD Tue Jan 21 21:40:14 2025

 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. 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 AMD 6.8.0-51-generic #52~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Mon Dec  9 15:00:52 UTC 2 x86_64 x86_64
```

(Continued on next page)

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Platform Notes (Continued)

```
  x86_64 GNU/Linux


   ----------------------------------------------------------
2. w
   21:40:14 up 8:25,  2 users,  load average: 108.73, 292.66, 344.30
   USER     TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   test     :1        :1               13:15   ?xdm?   5:42m  0.00s /usr/libexec/gdm-x-session --run-script env
   GNOME_SHELL_SESSION_MODE=ubuntu /usr/bin/gnome-session --session=ubuntu
   test     pts/1     -                14:29   7:10m  2.34s  0.07s sudo -s

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


   ----------------------------------------------------------
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              3093863
   nofiles              1024
   vmemory(kbytes)      unlimited
   locks                unlimited
   rtprio               0


   ----------------------------------------------------------
5. sysinfo process ancestry
   /sbin/init splash
   /lib/systemd/systemd --user
   /usr/libexec/gnome-terminal-server
   bash
   sudo -s
   sudo -s
   /bin/bash
   python3 ./run_amd_rate_aocc500_znver5_A1.py
   /bin/bash ./amd_rate_aocc500_znver5_A1.sh
   runcpu --config amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 fprate
   runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
     --runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
  $SPEC = /home/speccpu/cpu2017


   ----------------------------------------------------------
6. /proc/cpuinfo
   model name      : AMD EPYC 9654 96-Core Processor
   vendor_id       : AuthenticAMD
   cpu family      : 25
   model           : 17
   stepping        : 1
   microcode       : 0xa101148
   bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
   TLB size        : 3584 4K pages
   cpu cores       : 96
   siblings        : 192
```

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Platform Notes (Continued)

```
     2 physical ids (chips)
     384 processors (hardware threads)
     physical id 0: core ids 0-95
     physical id 1: core ids 0-95
     physical id 0: apicids 0-191
     physical id 1: apicids 256-447
  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):                           384
  On-line CPU(s) list:              0-383
  Vendor ID:                        AuthenticAMD
  Model name:                       AMD EPYC 9654 96-Core Processor
  CPU family:                       25
  Model:                            17
  Thread(s) per core:               2
  Core(s) per socket:               96
  Socket(s):                        2
  Stepping:                         1
  Frequency boost:                  enabled
  CPU max MHz:                      3707.8120
  CPU min MHz:                      1500.0000
  BogoMIPS:                         4799.63
  Flags:                            fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
                                    pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb
                                    rdtscp lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid
                                    extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid
                                    sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm
                                    cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
                                    osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
                                    perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
                                    ibrs ibpb stibp ibrs_enhanced 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
                                    user_shstk 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 x2avic v_spec_ctrl vnmi avx512vbmi umip pku
                                    ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                    avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
                                    debug_swap
  Virtualization:                   AMD-V
  L1d cache:                        6 MiB (192 instances)
  L1i cache:                        6 MiB (192 instances)
  L2 cache:                         192 MiB (192 instances)
  L3 cache:                         768 MiB (24 instances)
  NUMA node(s):                     2
  NUMA node0 CPU(s):                0-95,192-287
  NUMA node1 CPU(s):                96-191,288-383
  Vulnerability Gather data sampling: Not affected
  Vulnerability Itlb multihit:      Not affected
```

(Continued on next page)

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Platform Notes (Continued)

```
   Vulnerability L1tf:                Not affected
   Vulnerability Mds:                 Not affected
   Vulnerability Meltdown:            Not affected
   Vulnerability Mmio stale data:     Not affected
   Vulnerability Reg file data sampling: Not affected
   Vulnerability Retbleed:            Not affected
   Vulnerability Spec rstack overflow:   Mitigation; Safe RET
   Vulnerability Spec store bypass:   Mitigation; Speculative Store Bypass disabled via prctl
   Vulnerability Spectre v1:          Mitigation; usercopy/swapgs barriers and __user pointer sanitization
   Vulnerability Spectre v2:          Mitigation; Enhanced / Automatic IBRS; IBPB conditional; 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       6M   8 Data            1    64     1            64
       L1i      32K       6M   8 Instruction     1    64     1            64
       L2        1M     192M   8 Unified         2  2048     1            64
       L3       32M     768M  16 Unified         3 32768     1            64

   ------------------------------------------------------------
   8. numactl --hardware
   NOTE: a numactl 'node' might or might not correspond to a physical chip.
     available: 2 nodes (0-1)
     node 0 cpus: 0-95,192-287
     node 0 size: 386596 MB
     node 0 free: 380667 MB
     node 1 cpus: 96-191,288-383
     node 1 size: 386945 MB
     node 1 free: 381802 MB
     node distances:
     node   0   1
       0:  10  32
       1:  32  10

   ------------------------------------------------------------
   9. /proc/meminfo
     MemTotal:       792106932 kB

   ------------------------------------------------------------
   10. who -r
     run-level 5 Jan 21 12:48

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

   ------------------------------------------------------------
   12. Services, from systemctl list-unit-files
     STATE           UNIT FILES
     enabled         ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
                     accounts-daemon anacron anydesk apparmor avahi-daemon bluetooth console-setup cron cups
                     cups-browsed dmesg e2scrub_reap getty@ gpu-manager grub-common grub-initrd-fallback
                     irqbalance kerneloops keyboard-setup networkd-dispatcher openvpn power-profiles-daemon
                     rsyslog secureboot-db setvtrgb snapd ssh switcheroo-control systemd-oomd systemd-pstore
                     systemd-resolved systemd-timesyncd thermald ua-reboot-cmds ubuntu-advantage udisks2 ufw
                     unattended-upgrades wpa_supplicant
     enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
```

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Platform Notes (Continued)

```
   disabled          acpid brltty console-getty debug-shell ipmievd nftables openvpn-client@ openvpn-server@
                     openvpn@ rsync rtkit-daemon serial-getty@ speech-dispatcherd
                     systemd-boot-check-no-failures systemd-network-generator systemd-networkd
                     systemd-networkd-wait-online systemd-sysext systemd-time-wait-sync upower
                     wpa_supplicant-nl80211@ wpa_supplicant-wired@ wpa_supplicant@
   generated         apport openipmi speech-dispatcher
   indirect          saned@ spice-vdagentd uuidd
   masked            alsa-utils cryptdisks cryptdisks-early hwclock pulseaudio-enable-autospawn rc rcS saned
                     screen-cleanup sudo x11-common

   -----------------------------------------------------------
   13. Linux kernel boot-time arguments, from /proc/cmdline
     BOOT_IMAGE=/boot/vmlinuz-6.8.0-51-generic
     root=UUID=e953dd87-e49e-4230-a412-5a6320fe39a0
     ro
     quiet
     splash
     vt.handoff=7

   -----------------------------------------------------------
   14. cpupower frequency-info
     analyzing CPU 116:
       current policy: frequency should be within 1.50 GHz and 2.40 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:  2400MHz


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


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

(Continued on next page)

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Platform Notes (Continued)

```
      ----------------------------------------------------------
   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 Ubuntu 22.04.5 LTS

      ----------------------------------------------------------
   19. Disk information
   SPEC is set to: /home/speccpu/cpu2017
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/sda2      ext4  879G   35G  800G   5% /

      ----------------------------------------------------------
   20. /sys/devices/virtual/dmi/id
       Vendor:         FusionStor
       Product:        Fusionstor_Invento_i6000_EPYC_Series
       Product Family: Server
       Serial:         GNG6PB312A0006

      ----------------------------------------------------------
   21. 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 Samsung M321R4GA3PB0-CWMKJ 32 GB 2 rank 5600, configured at 4800


      ----------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:     FUSIONSTOR
     BIOS Version:    F18
     BIOS Date:       10/11/2024
     BIOS Revision:   5.27
```

Compiler Version Notes

```
==========================================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
------------------------------------------------------------------------------------------

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

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Compiler Version Notes (Continued)

```
C++              | 508.namd_r(base, peak) 510.parest_r(base, peak)
-----------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-----------------------------------------------------------------------------------------------


===============================================================================================
C++, C           | 511.povray_r(base, peak) 526.blender_r(base, peak)
-----------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-----------------------------------------------------------------------------------------------


===============================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
-----------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-----------------------------------------------------------------------------------------------


===============================================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
-----------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-----------------------------------------------------------------------------------------------


===============================================================================================
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
-----------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
-----------------------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Rate Result

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Fusionstor
(Test Sponsor: Meganet)

Invento i6000 EPYC (AMD EPYC 9654)

SPECrate®2017_fp_base = 1340

SPECrate®2017_fp_peak = 1450

CPU2017 License: 6221
Test Sponsor: Meganet
Tested by: Fusionstor system

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

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`
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 -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=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
```

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SPEC CPU®2017 Floating Point Rate Result

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SPECrate®2017_fp_base = 1340

Invento i6000 EPYC (AMD EPYC 9654)

SPECrate®2017_fp_peak = 1450

CPU2017 License: 6221   **Test Date:** Jan-2025
Test Sponsor: Meganet   **Hardware Availability:** Oct-2024
Tested by: Fusionstor system   **Software Availability:** Oct-2024

Base Optimization Flags (Continued)

C benchmarks (continued):
```
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang -ldl
```

C++ benchmarks:
```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang -ldl
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-aggressive-gather=true
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang -ldl
```

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
-Wl,-mllvm -Wl,-enable-aggressive-gather=true
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang -ldl
```

Benchmarks using both C and C++:
```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie
-flto -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
```

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SPEC CPU®2017 Floating Point Rate Result

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CPU2017 License: 6221
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Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
```
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
-ldl
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie
-flto -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
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang -ldl
```

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
```

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Invento i6000 EPYC (AMD EPYC 9654)

SPECrate®2017_fp_peak = 1450

CPU2017 License: 6221
Test Sponsor: Meganet
Tested by: Fusionstor system

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

Peak Compiler Invocation (Continued)

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

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

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

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

```
 519.lbm_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl
```

```
 538.imagick_r: basepeak = yes
```

```
 544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Ofast -march=znver5
-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 -ldl
```

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SPECrate®2017_fp_base = 1340

Invento i6000 EPYC (AMD EPYC 9654)

SPECrate®2017_fp_peak = 1450

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Test Sponsor: Meganet
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Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -m64 -std=c++14 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -ldl -lflang

554.roms_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -ldl -lflang

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-ldl -lflang

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

(Continued on next page)

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SPECrate®2017_fp_base = 1340

Invento i6000 EPYC (AMD EPYC 9654)

SPECrate®2017_fp_peak = 1450

CPU2017 License: 6221
Test Sponsor: Meganet
Tested by: Fusionstor system

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-2024

Peak Optimization Flags (Continued)

```
511.povray_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-extra-inliner -Ofast -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdalloc -ldl
```

```
526.blender_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-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 -lamdlibm -lamdalloc -ldl
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -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
-faggressive-loop-transform -fvector-transform -fscalar-transform
-Mrecursive -fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-ldl -lflang
```

Peak Other Flags

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

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

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Fusionstor
(Test Sponsor: Meganet)

Invento i6000 EPYC (AMD EPYC 9654)

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Test Sponsor: Meganet
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Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Oct-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/aocc500-flags.2024-10-10.html`
`http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-AMD-rev1.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.xml`
`http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-AMD-rev1.xml`

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

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