



SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

SPECrate®2017_fp_base = 1700

PowerEdge R7725 (AMD EPYC 9555 64-Core Processor)

SPECrate®2017_fp_peak = 1850

CPU2017 License: 6573

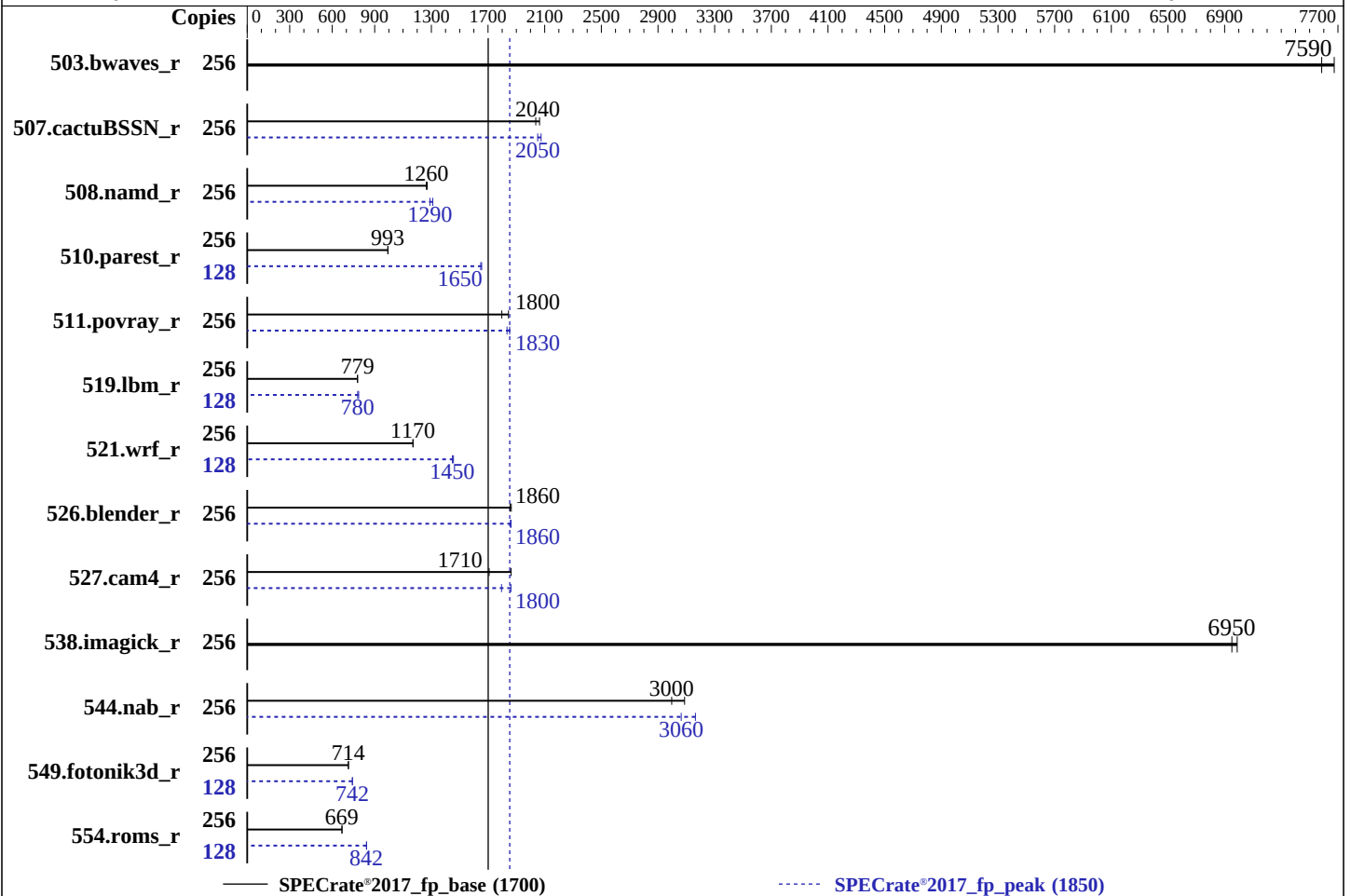
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Apr-2025

Hardware Availability: Mar-2025

Software Availability: Dec-2024



Hardware

CPU Name: AMD EPYC 9555
Max MHz: 4400
Nominal: 3200
Enabled: 128 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 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 / 8 cores
Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-6400B-R)
Storage: 140 GB on tmpfs
Other: CPU Cooling: Air

Software

OS: Ubuntu 24.04.1 LTS
6.8.0-51-generic
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
Parallel: No
Firmware: Version 1.1.3 released Feb-2025
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	256	338	7590	335	7670			256	338	7590	335	7670		
507.cactuBSSN_r	256	157	2060	159	2040			256	158	2050	156	2070		
508.namd_r	256	192	1260	191	1270			256	189	1290	186	1310		
510.parest_r	256	675	993	674	993			128	202	1660	203	1650		
511.povray_r	256	333	1800	324	1840			256	323	1850	326	1830		
519.lbm_r	256	346	779	346	779			128	173	780	171	787		
521.wrf_r	256	490	1170	490	1170			128	198	1450	197	1460		
526.blender_r	256	209	1860	210	1860			256	210	1860	209	1860		
527.cam4_r	256	240	1860	262	1710			256	249	1800	240	1860		
538.imagick_r	256	91.1	6990	91.6	6950			256	91.1	6990	91.6	6950		
544.nab_r	256	140	3090	144	3000			256	141	3060	136	3160		
549.fotonik3d_r	256	1398	714	1395	715			128	672	742	672	743		
554.roms_r	256	608	669	608	669			128	242	842	241	843		

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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,

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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 =

"/mnt/ramdisk/cpu2017-1.1.9-aocc500-znerv5_A1.3/amd_rate_aocc500_znver5_A_lib/lib:/mnt/ramdisk/cpu2017-1.1.9-aocc500-znerv5_A1.3/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

Benchmark run from a 140 GB ramdisk created with the cmd: "mount -t tmpfs -o size=140G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:

Virtualization Technology : Disabled
NUMA Nodes Per Socket : 4

System Profile : Custom
C-States : Disabled
Memory Patrol Scrub : Disabled
PCI ASPM L1 Link Power Management : Disabled
Periodic Directory Rinse Tuning : Blended
Determinism Control : Manual
Determinism Slider : Power Determinism
Optimizer Mode : Enabled
Adaptive Allocation : Enabled
Dram Refresh Delay : Performance
DIMM Self Healing -
on Uncorrectable Memory Error : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.9-aocc500-znerv5_A1.3/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on SLR7734-R7725 Fri Apr 18 22:30:12 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

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Platform Notes (Continued)

```
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.4)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
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 SLR7734-R7725 6.8.0-51-generic #52-Ubuntu SMP PREEMPT_DYNAMIC Thu Dec 5 13:09:44 UTC 2024 x86_64
x86_64 x86_64 GNU/Linux
-----

2. w
22:30:12 up 3:05, 1 user, load average: 160.58, 231.57, 244.29
USER      TTY      FROM            LOGIN@   IDLE   JCPU   PCPU   WHAT
root      tty1      -              19:25    3:00m  1.57s  0.57s  /bin/bash ./amd_rate_aocc500_znver5_A1.sh
-----

3. Username
From environment variable $USER: root
-----

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            6189077
nofiles            1024
vmemory(kbytes)    unlimited
locks              unlimited
rtprio             0
-----

5. sysinfo process ancestry
/sbin/init
/bin/login -p --
-bash
/bin/bash /home/DellFiles/bin/DELL_rate.sh
/bin/bash /home/DellFiles/bin/dell-run-main.sh rate
/bin/bash /home/DellFiles/bin/dell-run-main.sh rate
/bin/bash /home/DellFiles/bin/AMD/dell-run-speccpu.sh rate --define DL-VERS=6.2 --output_format html,pdf,txt
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 2 --define DL-BIOS-NPS=4
--define DL-VERS=6.2 --output_format html,pdf,txt fprate
```

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Platform Notes (Continued)

```
runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 2 --define
DL-BIOS-NPS=4 --define DL-VERS=6.2 --output_format html,pdf,txt --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 = /mnt/ramdisk/cpu2017-1.1.9-aocc500-znerv5_A1.3
```

6. /proc/cpuinfo

```
model name      : AMD EPYC 9555 64-Core Processor
vendor_id       : AuthenticAMD
cpu family      : 26
model           : 2
stepping        : 1
microcode       : 0xb00211e
bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size        : 192 4K pages
cpu cores       : 64
siblings        : 128
2 physical ids (chips)
256 processors (hardware threads)
physical id 0: core ids 0-63
physical id 1: core ids 0-63
physical id 0: apicids 0-127
physical id 1: apicids 128-255
```

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 2.39.3:

```
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):                 256
On-line CPU(s) list:    0-255
Vendor ID:              AuthenticAMD
BIOS Vendor ID:         AMD
Model name:             AMD EPYC 9555 64-Core Processor
BIOS Model name:        AMD EPYC 9555 64-Core Processor
BIOS CPU family:        107
CPU family:             26
Model:                  2
Thread(s) per core:     2
Core(s) per socket:     64
Socket(s):              2
Stepping:               1
Frequency boost:        enabled
CPU(s) scaling MHz:     73%
CPU max MHz:            4409.3750
CPU min MHz:            1500.0000
BogoMIPS:               6391.45
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 extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
```

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Platform Notes (Continued)

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 tsc_adjust bmi1 avx2
smep bmi2 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 avx_vnni 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 bus_lock_detect
movdiri movdir64b overflow_recov succor smca avx512_vp2intersect
flush_l1d debug_swap

L1d cache: 6 MiB (128 instances)
L1i cache: 4 MiB (128 instances)
L2 cache: 128 MiB (128 instances)
L3 cache: 512 MiB (16 instances)

NUMA node(s): 8
NUMA node0 CPU(s): 0-15,128-143
NUMA node1 CPU(s): 16-31,144-159
NUMA node2 CPU(s): 32-47,160-175
NUMA node3 CPU(s): 48-63,176-191
NUMA node4 CPU(s): 64-79,192-207
NUMA node5 CPU(s): 80-95,208-223
NUMA node6 CPU(s): 96-111,224-239
NUMA node7 CPU(s): 112-127,240-255

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 Reg file data sampling: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec rstack overflow: Not affected
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; PBRSE-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	48K	6M	12	Data	1	64	1	64
L1i	32K	4M	8	Instruction	1	64	1	64
L2	1M	128M	16	Unified	2	1024	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: 0-15,128-143
node 0 size: 192741 MB
node 0 free: 190603 MB
node 1 cpus: 16-31,144-159
node 1 size: 193522 MB
node 1 free: 189583 MB

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Platform Notes (Continued)

```
node 2 cpus: 32-47,160-175
node 2 size: 193522 MB
node 2 free: 191723 MB
node 3 cpus: 48-63,176-191
node 3 size: 193506 MB
node 3 free: 191734 MB
node 4 cpus: 64-79,192-207
node 4 size: 193522 MB
node 4 free: 191772 MB
node 5 cpus: 80-95,208-223
node 5 size: 193522 MB
node 5 free: 191859 MB
node 6 cpus: 96-111,224-239
node 6 size: 193522 MB
node 6 free: 188425 MB
node 7 cpus: 112-127,240-255
node 7 size: 193483 MB
node 7 free: 191781 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10 12 12 12 32 32 32 32
1:  12 10 12 12 32 32 32 32
2:  12 12 10 12 32 32 32 32
3:  12 12 12 10 32 32 32 32
4:  32 32 32 32 10 12 12 12
5:  32 32 32 32 12 10 12 12
6:  32 32 32 32 12 12 10 12
7:  32 32 32 32 12 12 12 10
```

```
-----
9. /proc/meminfo
MemTotal:      1584482792 kB
```

```
-----
10. who -r
run-level 3 Apr 18 19:24
```

```
-----
11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.4)
Default Target    Status
multi-user        running
```

```
-----
12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
accounts-daemon anacron apparmor apport avahi-daemon blk-availability bluetooth
cloud-config cloud-final cloud-init cloud-init-local console-setup cron cups cups-browsed
dmesg e2scrub_reap finalrd getty@ gnome-remote-desktop gpu-manager grub-common
grub-initrd-fallback kerneloops keyboard-setup lm-sensors lvm2-monitor multipathd
networkd-dispatcher networking nvme-fc-boot-connections nvme-fc-autoconnect open-iscsi
open-vm-tools openvpn pollinate power-profiles-daemon rsyslog secureboot-db setvtrgb snapd
ssl-cert sssd switcheroo-control sysstat systemd-networkd systemd-oond systemd-pstore
systemd-resolved systemd-timesyncd thermald tuned ua-reboot-cmds ubuntu-advantage udisks2
ufw vgauth wpa_supplicant
enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
disabled brltty console-getty debug-shell fio ifupdown-wait-online iscsid nftables openvpn-client@
openvpn-server@ openvpn@ rsync rtkit-daemon serial-getty@ speech-dispatcherd ssh
systemd-boot-check-no-failures systemd-confext systemd-network-generator
systemd-networkd-wait-online@ systemd-pcrlock-file-system systemd-pcrlock-firmware-code
```

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Platform Notes (Continued)

generated indirect masked
systemd-PCRlock-firmware-config systemd-PCRlock-machine-id systemd-PCRlock-make-policy
systemd-PCRlock-secureboot-authority systemd-PCRlock-secureboot-policy systemd-sysex
systemd-time-wait-sync upower wpa_supplicant-nl80211@ wpa_supplicant-wired@
wpa_supplicant@
speech-dispatcher
saned@ spice-vdagentd sssd-autofs sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
systemd-sysupdate systemd-sysupdate-reboot uidd
alsa-utils cryptdisks cryptdisks-early hwclock multipath-tools-boot saned screen-cleanup
sudo systemd-networkd-wait-online x11-common

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-6.8.0-51-generic
root=UUID=8458ae54-58cc-4621-9289-b1d743fde503
ro

14. cpupower frequency-info
analyzing CPU 132:
current policy: frequency should be within 1.50 GHz and 3.20 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: 3200MHz

15. tuned-adm active
Current active profile: latency-performance

16. sysctl
kernel.numa_balancing 1
kernel.randomize_va_space 0
vm.compaction_proactiveness 20
vm.dirty_background_bytes 0
vm.dirty_background_ratio 3
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

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Platform Notes (Continued)

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 24.04.1 LTS
```

20. Disk information

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-aocc500-znerv5_A1.3

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
tmpfs	tmpfs	140G	3.3G	137G	3%	/mnt/ramdisk

21. /sys/devices/virtual/dmi/id

```
Vendor: Dell Inc.
Product: PowerEdge R7725
Product Family: PowerEdge
Serial: SLR7734
```

22. dmidecode

Additional information from dmidecode 3.5 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 80AD000080AD HMC94AHBRA277N 64 GB 2 rank 6400

23. BIOS

(This section combines info from /sys/devices and dmidecode.)

```
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.3
BIOS Date: 02/25/2025
BIOS Revision: 1.1
```

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
=====



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CPU2017 License: 6573

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Apr-2025

Hardware Availability: Mar-2025

Software Availability: Dec-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 -fltto
-fstruct-layout=7 -mllvm -unroll-threshold=50

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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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Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

-mllvm -loop-unswitch-threshold=2000000 -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=2000000 -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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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
-freemap-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 -freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl
```

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Peak Optimization Flags (Continued)

C++ benchmarks:

```
508.namd_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
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl
```

```
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
```

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Peak Optimization Flags (Continued)

521.wrf_r (continued):

-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-ldl -lflang

527.cam4_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -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 -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-ldl -lflang

Benchmarks using both C and C++:

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

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

-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

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/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.8.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/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.8.xml>

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