



# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR645 V3  
(3.65 GHz, AMD EPYC 9475F)

SPECrate®2017\_fp\_base = 1600

SPECrate®2017\_fp\_peak = 1680

CPU2017 License: 9017

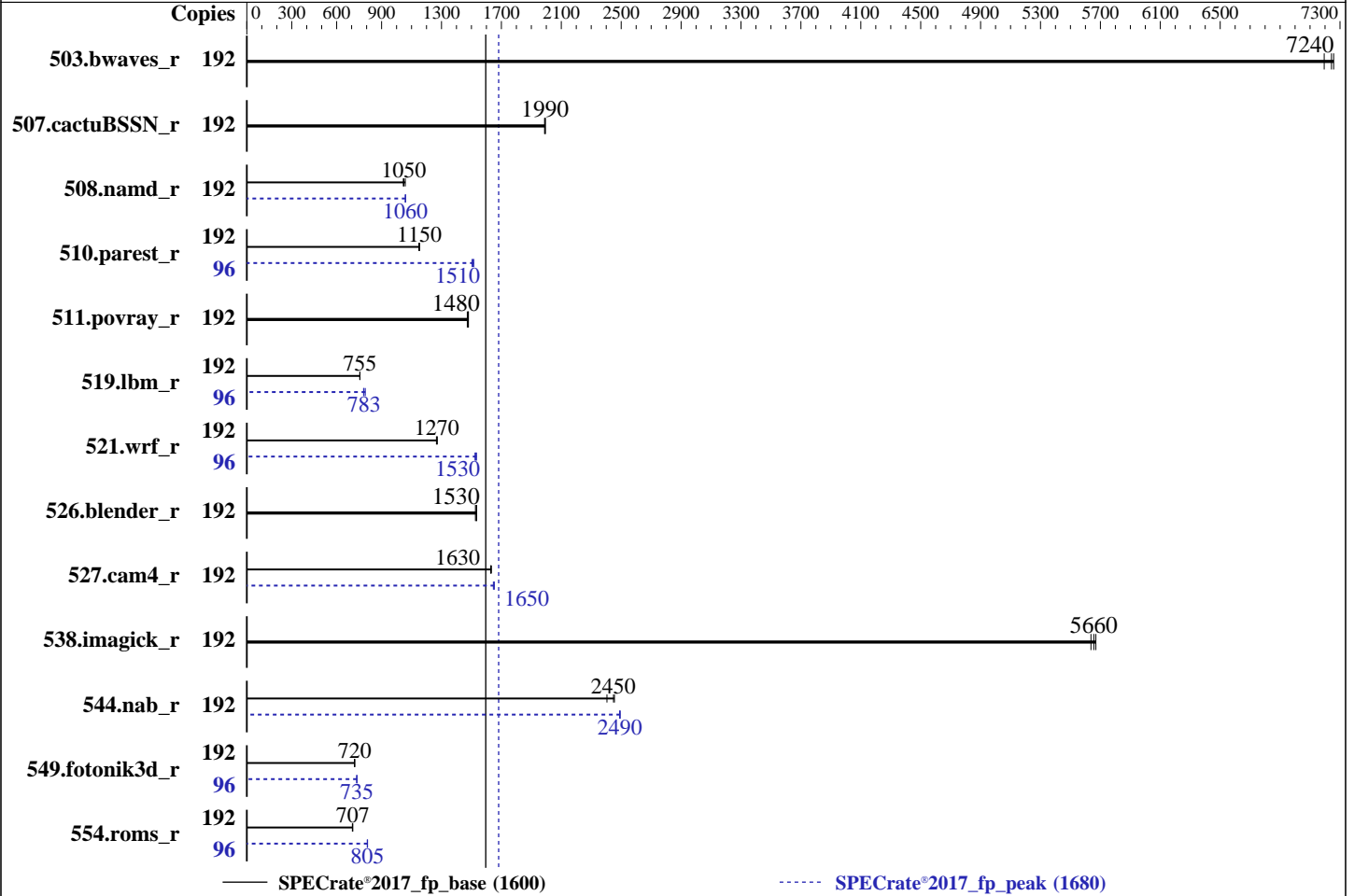
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2025

Hardware Availability: Feb-2025

Software Availability: Oct-2024



### Hardware

CPU Name: AMD EPYC 9475F  
 Max MHz: 4800  
 Nominal: 3650  
 Enabled: 96 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 / 6 cores  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx8 PC5-6400B-R, running at 6000)  
 Storage: 1 x 480 GB SATA SSD  
 Other: CPU Cooling: CLC

### Software

OS: SUSE Linux Enterprise Server 15 SP6  
 Kernel 6.4.0-150600.21-default  
 Compiler: C/C++/Fortran: Version 5.0.0 of AOCC  
 Parallel: No  
 Firmware: Lenovo BIOS Version KAE131I 5.30 released Dec-2024  
 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

| Benchmark       | Base   |            |             |             |             |             |             | Peak   |            |            |             |             |            |             |
|-----------------|--------|------------|-------------|-------------|-------------|-------------|-------------|--------|------------|------------|-------------|-------------|------------|-------------|
|                 | Copies | Seconds    | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Copies | Seconds    | Ratio      | Seconds     | Ratio       | Seconds    | Ratio       |
| 503.bwaves_r    | 192    | 265        | 7260        | <b>266</b>  | <b>7240</b> | 268         | 7190        | 192    | 265        | 7260       | <b>266</b>  | <b>7240</b> | 268        | 7190        |
| 507.cactuBSSN_r | 192    | 122        | 1990        | 122         | 1990        | <b>122</b>  | <b>1990</b> | 192    | 122        | 1990       | 122         | 1990        | <b>122</b> | <b>1990</b> |
| 508.namd_r      | 192    | 172        | 1060        | <b>174</b>  | <b>1050</b> | 175         | 1040        | 192    | 172        | 1060       | <b>172</b>  | <b>1060</b> | 172        | 1060        |
| 510.parest_r    | 192    | <b>436</b> | <b>1150</b> | 435         | 1150        | 437         | 1150        | 96     | 166        | 1520       | 167         | 1500        | <b>166</b> | <b>1510</b> |
| 511.povray_r    | 192    | 305        | 1470        | 303         | 1480        | <b>303</b>  | <b>1480</b> | 192    | 305        | 1470       | 303         | 1480        | <b>303</b> | <b>1480</b> |
| 519.lbm_r       | 192    | <b>268</b> | <b>755</b>  | 268         | 755         | 268         | 756         | 96     | <b>129</b> | <b>783</b> | 128         | 791         | 130        | 780         |
| 521.wrf_r       | 192    | <b>339</b> | <b>1270</b> | 338         | 1270        | 340         | 1270        | 96     | 140        | 1530       | <b>141</b>  | <b>1530</b> | 141        | 1520        |
| 526.blender_r   | 192    | 190        | 1540        | <b>191</b>  | <b>1530</b> | 192         | 1530        | 192    | 190        | 1540       | <b>191</b>  | <b>1530</b> | 192        | 1530        |
| 527.cam4_r      | 192    | 206        | 1630        | <b>206</b>  | <b>1630</b> | 206         | 1630        | 192    | 204        | 1650       | <b>203</b>  | <b>1650</b> | 203        | 1650        |
| 538.imagick_r   | 192    | 84.7       | 5640        | <b>84.4</b> | <b>5660</b> | 84.2        | 5670        | 192    | 84.7       | 5640       | <b>84.4</b> | <b>5660</b> | 84.2       | 5670        |
| 544.nab_r       | 192    | <b>132</b> | <b>2450</b> | 132         | 2450        | 134         | 2400        | 192    | 130        | 2490       | <b>130</b>  | <b>2490</b> | 130        | 2490        |
| 549.fotonik3d_r | 192    | 1039       | 720         | 1041        | 719         | <b>1039</b> | <b>720</b>  | 96     | <b>509</b> | <b>735</b> | 509         | 734         | 509        | 735         |
| 554.roms_r      | 192    | <b>432</b> | <b>707</b>  | 433         | 705         | 431         | 707         | 96     | 190        | 805        | 189         | 806         | <b>190</b> | <b>805</b>  |

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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.

cpupower set to performance mode

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### Operating System Notes (Continued)

```
cpupower frequency-set -r -g performance
To enable Transparent Hugepages (THP) for all allocations:
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

### Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017-1.1.9-amd
-aocc500_znver5_A1.2/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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

### Platform Notes

BIOS configuration:  
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode  
P-State set to Enabled  
ACPI SRAT L3 Cache as NUMA Domain set to Enabled  
L1 Stride Prefetcher set to Disabled  
NUMA Nodes per Socket set to NPS2

Sysinfo program /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1.2/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost Fri Feb 7 07:22:51 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 254 (254.10+suse.84.ge8d77af424)
12. Services, from systemctl list-unit-files

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### Platform Notes (Continued)

- 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 localhost 6.4.0-150600.21-default #1 SMP PREEMPT_DYNAMIC Thu May 16 11:09:22 UTC 2024 (36c1e09)
x86_64 x86_64 x86_64 GNU/Linux
-----
```

```
-----
2. w
07:22:51 up 5:32, 1 user, load average: 23.53, 77.73, 114.32
USER      TTY      FROM      LOGIN@   IDLE   JCPU   PCPU WHAT
-----
```

```
-----
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) 3094018
max locked memory       (kbytes, -l) 2097152
max memory size         (kbytes, -m) unlimited
open files               (-n) 1024
pipe size                (512 bytes, -p) 8
POSIX message queues    (bytes, -q) 819200
real-time priority      (-r) 0
stack size              (kbytes, -s) unlimited
cpu time                 (seconds, -t) unlimited
max user processes      (-u) 3094018
virtual memory           (kbytes, -v) unlimited
file locks               (-x) unlimited
-----
```

```
-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize=42
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@notty
/bin/bash ./02.remote_local_SPECcpu_1.01.sh
/bin/bash ./Run026-compliant-amd-ratefp.sh
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/CPU2017.055/templogs/preenv.fprate.055.0.log --lognum 055.0 --from_runcpu 2
-----
```

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### Platform Notes (Continued)

```
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-amd-aocc500_znver5_A1.2
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 9475F 48-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 26
model          : 2
stepping       : 1
microcode      : 0xb00211a
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size       : 192 4K pages
cpu cores      : 48
siblings       : 96
2 physical ids (chips)
192 processors (hardware threads)
physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
physical id 1: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
physical id 0: apicids 0-11,16-27,32-43,48-59,64-75,80-91,96-107,112-123
physical id 1: apicids 128-139,144-155,160-171,176-187,192-203,208-219,224-235,240-251
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
virtualized systems. Use the above data carefully.
```

#### 7. lscpu

```
-----
From lscpu from util-linux 2.39.3:
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):                 192
On-line CPU(s) list:   0-191
Vendor ID:              AuthenticAMD
BIOS Vendor ID:         Advanced Micro Devices, Inc.
Model name:             AMD EPYC 9475F 48-Core Processor
BIOS Model name:        AMD EPYC 9475F 48-Core Processor
BIOS CPU family:        107
CPU family:             26
Model:                  2
Thread(s) per core:    2
Core(s) per socket:    48
Socket(s):              2
Stepping:               1
Frequency boost:        enabled
CPU(s) scaling MHz:    100%
CPU max MHz:            3650.0000
CPU min MHz:           1500.0000
BogoMIPS:               7288.76
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
rdtsmp 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 fl16c 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 tsc_adjust bmi1 avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
```

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### Platform Notes (Continued)

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 fsrm avx512\_vp2intersect  
flush\_llid debug\_swap

#### Virtualization:

AMD-V  
L1d cache: 4.5 MiB (96 instances)  
L1i cache: 3 MiB (96 instances)  
L2 cache: 96 MiB (96 instances)  
L3 cache: 512 MiB (16 instances)

NUMA node(s): 16  
NUMA node0 CPU(s): 0-5,96-101  
NUMA node1 CPU(s): 6-11,102-107  
NUMA node2 CPU(s): 12-17,108-113  
NUMA node3 CPU(s): 18-23,114-119  
NUMA node4 CPU(s): 24-29,120-125  
NUMA node5 CPU(s): 30-35,126-131  
NUMA node6 CPU(s): 36-41,132-137  
NUMA node7 CPU(s): 42-47,138-143  
NUMA node8 CPU(s): 48-53,144-149  
NUMA node9 CPU(s): 54-59,150-155  
NUMA node10 CPU(s): 60-65,156-161  
NUMA node11 CPU(s): 66-71,162-167  
NUMA node12 CPU(s): 72-77,168-173  
NUMA node13 CPU(s): 78-83,174-179  
NUMA node14 CPU(s): 84-89,180-185  
NUMA node15 CPU(s): 90-95,186-191

Vulnerability Gather data sampling: Not affected  
Vulnerability Itlb multihit: Not affected  
Vulnerability L1tf: Not affected  
Vulnerability Mds: Not affected  
Vulnerability Meltdown: Not affected  
Vulnerability Mmio stale data: Not affected  
Vulnerability 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/swaps 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      | 4.5M     | 12   | Data        | 1     | 64    | 1        | 64             |
| L1i  | 32K      | 3M       | 8    | Instruction | 1     | 64    | 1        | 64             |
| L2   | 1M       | 96M      | 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: 16 nodes (0-15)  
node 0 cpus: 0-5,96-101

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### Platform Notes (Continued)

```

node 0 size: 47958 MB
node 0 free: 47391 MB
node 1 cpus: 6-11,102-107
node 1 size: 48380 MB
node 1 free: 47781 MB
node 2 cpus: 12-17,108-113
node 2 size: 48380 MB
node 2 free: 47813 MB
node 3 cpus: 18-23,114-119
node 3 size: 48380 MB
node 3 free: 47901 MB
node 4 cpus: 24-29,120-125
node 4 size: 48380 MB
node 4 free: 47629 MB
node 5 cpus: 30-35,126-131
node 5 size: 48380 MB
node 5 free: 47759 MB
node 6 cpus: 36-41,132-137
node 6 size: 48380 MB
node 6 free: 47885 MB
node 7 cpus: 42-47,138-143
node 7 size: 48380 MB
node 7 free: 47751 MB
node 8 cpus: 48-53,144-149
node 8 size: 48380 MB
node 8 free: 47729 MB
node 9 cpus: 54-59,150-155
node 9 size: 48380 MB
node 9 free: 47773 MB
node 10 cpus: 60-65,156-161
node 10 size: 48380 MB
node 10 free: 47778 MB
node 11 cpus: 66-71,162-167
node 11 size: 48380 MB
node 11 free: 47771 MB
node 12 cpus: 72-77,168-173
node 12 size: 48342 MB
node 12 free: 47760 MB
node 13 cpus: 78-83,174-179
node 13 size: 48281 MB
node 13 free: 47756 MB
node 14 cpus: 84-89,180-185
node 14 size: 48380 MB
node 14 free: 47781 MB
node 15 cpus: 90-95,186-191
node 15 size: 48380 MB
node 15 free: 47896 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
0: 10 11 11 11 11 12 12 12 12 32 32 32 32 32 32 32
1: 11 10 11 11 11 12 12 12 12 32 32 32 32 32 32 32
2: 11 11 10 11 12 12 12 12 12 32 32 32 32 32 32 32
3: 11 11 11 10 12 12 12 12 12 32 32 32 32 32 32 32
4: 12 12 12 12 10 11 11 11 11 32 32 32 32 32 32 32
5: 12 12 12 12 11 10 11 11 11 32 32 32 32 32 32 32
6: 12 12 12 12 11 11 10 11 11 32 32 32 32 32 32 32
7: 12 12 12 12 11 11 11 10 11 32 32 32 32 32 32 32
8: 32 32 32 32 32 32 32 32 10 11 11 11 12 12 12 12
9: 32 32 32 32 32 32 32 32 11 10 11 11 12 12 12 12
10: 32 32 32 32 32 32 32 32 11 11 10 11 12 12 12 12

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### Platform Notes (Continued)

|     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 11: | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 11 | 11 | 11 | 10 | 12 | 12 | 12 | 12 |
| 12: | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 12 | 12 | 12 | 12 | 10 | 11 | 11 | 11 |
| 13: | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 12 | 12 | 12 | 12 | 11 | 10 | 11 | 11 |
| 14: | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 12 | 12 | 12 | 12 | 11 | 11 | 10 | 11 |
| 15: | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 12 | 12 | 12 | 12 | 11 | 11 | 11 | 10 |

9. /proc/meminfo  
MemTotal: 792095608 kB

10. who -r  
run-level 3 Feb 7 01:50

11. Systemd service manager version: systemd 254 (254.10+suse.84.ge8d77af424)  
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@ irqbalance issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog sapconf smartd sshd systemctl-logger systemd-pstore tuned 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 ebttables exchange-bmc-os-info firewallld fsidd gpm grub2-once haveged hwloc-dump-hwdata ipmi ipmievld issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd sysstat systemd-boot-check-no-failures systemd-confext systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd |
| generated       | ntp_sync  |
| indirect        | systemd-userdbd uuidd wickedd   |

13. Linux kernel boot-time arguments, from /proc/cmdline  
BOOT\_IMAGE=/boot/vmlinuz-6.4.0-150600.21-default  
root=UUID=36ce2ea9-ca92-4f5a-b22a-9bea62fad028  
splash=silent  
mitigations=auto  
quiet  
security=apparmor

14. cpupower frequency-info  
analyzing CPU 118:  
current policy: frequency should be within 1.50 GHz and 3.65 GHz.  
The governor "performance" may decide which speed to use within this range.  
boost state support:  
Supported: yes  
Active: yes

15. tuned-adm active  
Current active profile: virtual-host

(Continued on next page)





# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR645 V3  
(3.65 GHz, AMD EPYC 9475F)

SPECrate®2017\_fp\_base = 1600

SPECrate®2017\_fp\_peak = 1680

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

### Platform Notes (Continued)

-----  
16. sysctl

|                              |       |
|------------------------------|-------|
| kernel.numa_balancing        | 1     |
| kernel.randomize_va_space    | 0     |
| vm.compaction_proactiveness  | 20    |
| vm.dirty_background_bytes    | 0     |
| vm.dirty_background_ratio    | 5     |
| 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+madvise madvise never         |
| enabled        | [always] madvise never                       |
| hpage_pmd_size | 2097152                                      |
| shmem_enabled  | always within_size advise [never] deny force |

-----  
18. /sys/kernel/mm/transparent\_hugepage/khugepaged

|                       |       |
|-----------------------|-------|
| alloc_sleep_millisecs | 60000 |
| defrag                | 1     |
| max_ptes_none         | 511   |
| max_ptes_shared       | 256   |
| max_ptes_swap         | 64    |
| pages_to_scan         | 4096  |
| scan_sleep_millisecs  | 10000 |

-----  
19. OS release

|            |                                     |
|------------|-------------------------------------|
| From       | /etc/*-release /etc/*-version       |
| os-release | SUSE Linux Enterprise Server 15 SP6 |

-----  
20. Disk information

SPEC is set to: /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1.2

| Filesystem | Type | Size | Used | Avail | Use% | Mounted on |
|------------|------|------|------|-------|------|------------|
| /dev/sda3  | xfs  | 442G | 109G | 333G  | 25%  | /          |

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

|                 |                      |
|-----------------|----------------------|
| Vendor:         | Lenovo               |
| Product:        | ThinkSystem SR645 V3 |
| Product Family: | ThinkSystem          |
| Serial:         | 1234567890           |

-----  
22. dmidecode

Additional information from dmidecode 3.4 follows. WARNING: Use caution when you interpret this section.

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR645 V3  
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SPECrate®2017\_fp\_base = 1600

SPECrate®2017\_fp\_peak = 1680

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

**Test Date:** Feb-2025  
**Hardware Availability:** Feb-2025  
**Software Availability:** Oct-2024

### Platform Notes (Continued)

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:

- 12x SK Hynix HMC88AHB471N 32 GB 2 rank 6400, configured at 6000
- 2x SK Hynix HMC88AHB472N 32 GB 2 rank 6400, configured at 6000
- 10x SK Hynix HMC88AHB478N 32 GB 2 rank 6400, configured at 6000

#### 23. BIOS

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

```

BIOS Vendor:      Lenovo
BIOS Version:    KAE131I-5.30
BIOS Date:      12/17/2024
BIOS Revision:   5.30
Firmware Revision: 54.6

```

### 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

```

=====  
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)

```

(Continued on next page)



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## Lenovo Global Technology

ThinkSystem SR645 V3  
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SPECrate®2017\_fp\_peak = 1680

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

## Compiler Version Notes (Continued)

```

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

```

## 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



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**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

## 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
-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

```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

SPECrate®2017\_fp\_base = 1600

ThinkSystem SR645 V3  
(3.65 GHz, AMD EPYC 9475F)

SPECrate®2017\_fp\_peak = 1680

CPU2017 License: 9017

Test Date: Feb-2025

Test Sponsor: Lenovo Global Technology

Hardware Availability: Feb-2025

Tested by: Lenovo Global Technology

Software Availability: Oct-2024

## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

-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  
-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

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Lenovo Global Technology**

ThinkSystem SR645 V3  
(3.65 GHz, AMD EPYC 9475F)

SPECrate®2017\_fp\_base = 1600

SPECrate®2017\_fp\_peak = 1680

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

## Base Other Flags (Continued)

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

## Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Peak Portability Flags

Same as Base Portability Flags



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**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

## 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
```

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
```

(Continued on next page)





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**Test Sponsor:** Lenovo Global Technology

**Hardware Availability:** Feb-2025

**Tested by:** Lenovo Global Technology

**Software Availability:** Oct-2024

## Peak Optimization Flags (Continued)

549.fotonik3d\_r (continued):

```
-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: -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: basepeak = yes

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN\_r: basepeak = yes



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(3.65 GHz, AMD EPYC 9475F)

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SPECrate®2017\_fp\_peak = 1680

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2025

**Hardware Availability:** Feb-2025

**Software Availability:** Oct-2024

## Peak Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Turin-E.html>

<http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.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-Turin-E.xml>

<http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.xml>

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