



# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology

ThinkSystem SR665 V3  
(2.25 GHz, AMD EPYC 9754)

SPECspeed®2017\_fp\_base = 426

SPECspeed®2017\_fp\_peak = 434

CPU2017 License: 9017

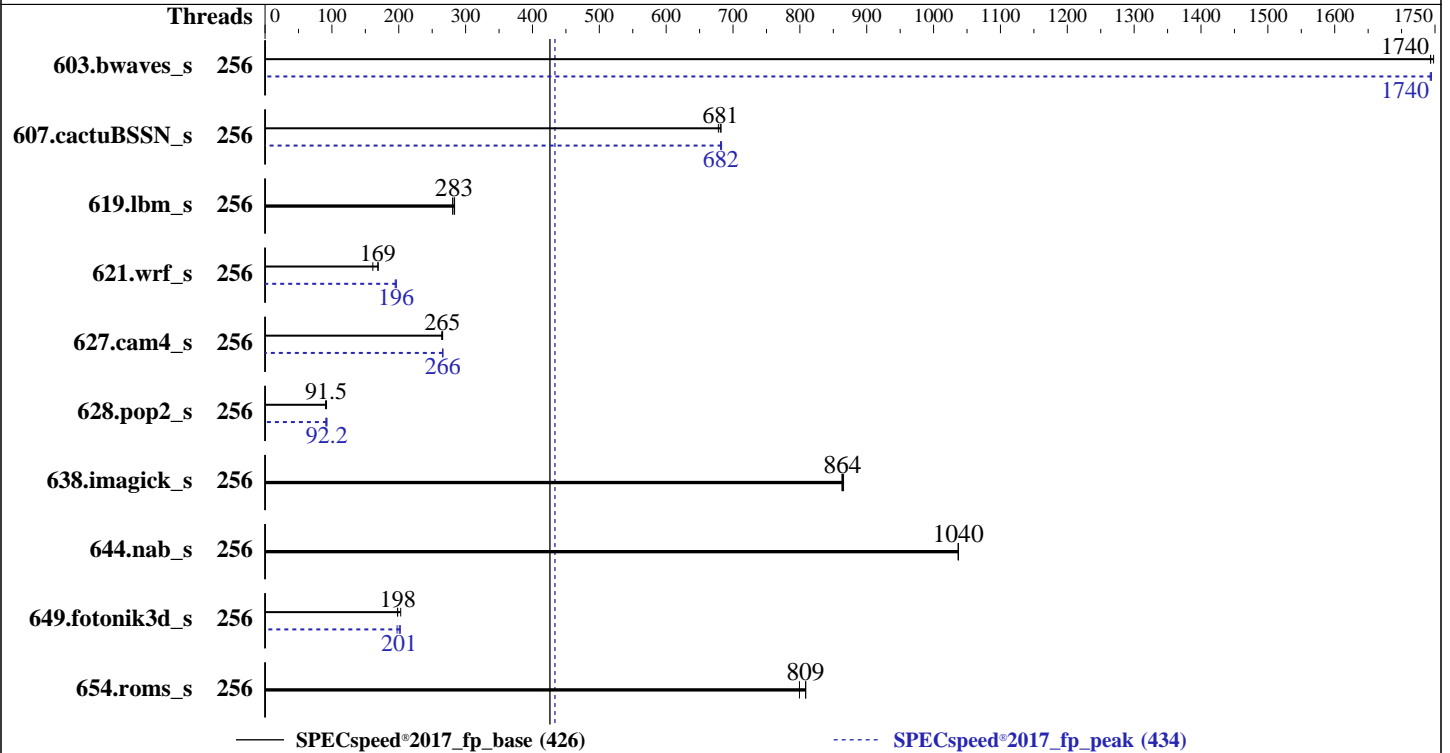
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2023

Hardware Availability: Aug-2023

Software Availability: Nov-2022



### Hardware

CPU Name: AMD EPYC 9754  
 Max MHz: 3100  
 Nominal: 2250  
 Enabled: 256 cores, 2 chips  
 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: 256 MB I+D on chip per chip,  
 16 MB shared / 8 cores  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86\_64)  
 Kernel 5.14.21-150400.22-default  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: Yes  
 Firmware: Lenovo BIOS Version KAE111J 2.10 released May-2023  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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## Results Table

| Benchmark       | Base    |                    |                    |                    |                    |                    |                   | Peak    |                    |                    |                    |                    |                    |                   |
|-----------------|---------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|---------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
|                 | Threads | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio             | Threads | Seconds            | Ratio              | Seconds            | Ratio              | Seconds            | Ratio             |
| 603.bwaves_s    | 256     | 33.8               | 1740               | <b><u>33.8</u></b> | <b><u>1740</u></b> | 33.8               | 1750              | 256     | <b><u>33.8</u></b> | <b><u>1740</u></b> | 33.9               | 1740               | 33.8               | 1740              |
| 607.cactuBSSN_s | 256     | 24.6               | 678                | <b><u>24.5</u></b> | <b><u>681</u></b>  | 24.4               | 682               | 256     | 24.4               | 683                | 24.5               | 682                | <b><u>24.5</u></b> | <b><u>682</u></b> |
| 619.lbm_s       | 256     | 18.5               | 284                | <b><u>18.5</u></b> | <b><u>283</u></b>  | 18.7               | 280               | 256     | 18.5               | 284                | <b><u>18.5</u></b> | <b><u>283</u></b>  | 18.7               | 280               |
| 621.wrf_s       | 256     | 82.0               | 161                | <b><u>78.4</u></b> | <b><u>169</u></b>  | 78.1               | 169               | 256     | 68.0               | 195                | 67.4               | 196                | <b><u>67.5</u></b> | <b><u>196</u></b> |
| 627.cam4_s      | 256     | 33.4               | 266                | <b><u>33.4</u></b> | <b><u>265</u></b>  | 33.5               | 264               | 256     | 33.4               | 266                | <b><u>33.3</u></b> | <b><u>266</u></b>  | 33.3               | 266               |
| 628.pop2_s      | 256     | <b><u>130</u></b>  | <b><u>91.5</u></b> | 131                | 90.5               | 129                | 92.0              | 256     | 131                | 90.9               | <b><u>129</u></b>  | <b><u>92.2</u></b> | 128                | 92.5              |
| 638.imagick_s   | 256     | 16.7               | 863                | 16.7               | 865                | <b><u>16.7</u></b> | <b><u>864</u></b> | 256     | 16.7               | 863                | 16.7               | 865                | <b><u>16.7</u></b> | <b><u>864</u></b> |
| 644.nab_s       | 256     | 16.9               | 1040               | <b><u>16.8</u></b> | <b><u>1040</u></b> | 16.8               | 1040              | 256     | 16.9               | 1040               | <b><u>16.8</u></b> | <b><u>1040</u></b> | 16.8               | 1040              |
| 649.fotonik3d_s | 256     | 44.9               | 203                | <b><u>46.0</u></b> | <b><u>198</u></b>  | 46.0               | 198               | 256     | 46.2               | 198                | 45.1               | 202                | <b><u>45.4</u></b> | <b><u>201</u></b> |
| 654.roms_s      | 256     | <b><u>19.5</u></b> | <b><u>809</u></b>  | 19.7               | 799                | 19.5               | 809               | 256     | <b><u>19.5</u></b> | <b><u>809</u></b>  | 19.7               | 799                | 19.5               | 809               |

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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,  
'echo always > /sys/kernel/mm/transparent\_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root.  
To always enable THP for peak runs of:  
603.bwaves\_s, 607.cactuBSSN\_s, 619.lbm\_s, 627.cam4\_s, 628.pop2\_s, 638.imagick\_s, 644.nab\_s, 649.fotonik3d\_s:  
'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled; echo always > /sys/kernel/mm/transparent\_hugepage/defrag'  
run as root.  
To disable THP for peak runs of 621.wrf\_s:

(Continued on next page)



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## Operating System Notes (Continued)

```
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'  
run as root.
```

To enable THP only on request for peak runs of 654.roms\_s:

```
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'  
run as root.
```

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
GOMP_CPU_AFFINITY = "0-255"  
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-amd-aocc400_znver4_A1/amd_speed_aocc400_znver4_A_lib/lib:"  
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"  
MALLOC_CONF = "oversize_threshold:0,retain:true"  
OMP_DYNAMIC = "false"  
OMP_SCHEDULE = "static"  
OMP_STACKSIZE = "128M"  
OMP_THREAD_LIMIT = "256"
```

Environment variables set by runcpu during the 603.bwaves\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"
```

Environment variables set by runcpu during the 607.cactuBSSN\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"
```

Environment variables set by runcpu during the 621.wrf\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"
```

Environment variables set by runcpu during the 627.cam4\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"
```

Environment variables set by runcpu during the 628.pop2\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"
```

Environment variables set by runcpu during the 649.fotonik3d\_s peak run:

```
GOMP_CPU_AFFINITY = "0-255"  
PGHPPF_ZMEM = "yes"
```

## General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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

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

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

## Platform Notes

BIOS configuration:

Operating Mode set to Maximum Performance

SMT Mode set to Disabled

(Continued on next page)



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### Platform Notes (Continued)

Sysinfo program /home/cpu2017-1.1.9-amd-aocc400\_znver4\_A1/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost Sun May 14 20:51:07 2023

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

#### Table of contents

- 1. uname -a
- 2. w
- 3. Username
- 4. ulimit -a
- 5. sysinfo process ancestry
- 6. /proc/cpuinfo
- 7. lscpu
- 8. numactl --hardware
- 9. /proc/meminfo
- 10. who -r
- 11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
- 12. Services, from systemctl list-unit-files
- 13. Linux kernel boot-time arguments, from /proc/cmdline
- 14. cpupower frequency-info
- 15. sysctl
- 16. /sys/kernel/mm/transparent\_hugepage
- 17. /sys/kernel/mm/transparent\_hugepage/khugepaged
- 18. OS release
- 19. Disk information
- 20. /sys/devices/virtual/dmi/id
- 21. dmidecode
- 22. BIOS

```

1. uname -a
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux

2. w
 20:51:07 up 53 min,  1 user,  load average: 112.10, 202.58, 212.04
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU WHAT
root      tty1    -             19:58   49:07   1.33s   0.11s /bin/bash ./amd_speed_aocc400_znver4_A1.sh

```

```

3. Username
From environment variable $USER:  root

```

```

4. ulimit -a
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority     (-e) 0
file size               (blocks, -f) unlimited
pending signals         (-i) 3093997
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

```

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### Platform Notes (Continued)

```

real-time priority      (-r) 0
stack size              (kbytes, -s) unlimited
cpu time                (seconds, -t) unlimited
max user processes     (-u) 3093997
virtual memory         (kbytes, -v) unlimited
file locks              (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
/bin/bash ./run_SR665V3_bergamo_1.01.sh
/bin/bash ./Run036-compliant-amd-speedfp.sh
python3 ./run_amd_speed_aocc400_znver4_A1.py
/bin/bash ./amd_speed_aocc400_znver4_A1.sh
runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fpspeed
runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.044/templogs/preenv.fpspeed.044.0.log --lognum 044.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-amd-aocc400_znver4_A1

```

```

-----
6. /proc/cpuinfo
model name      : AMD EPYC 9754 128-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 160
stepping       : 2
microcode      : 0xaa00208
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 3584 4K pages
cpu cores      : 128
siblings       : 128
2 physical ids (chips)
256 processors (hardware threads)
physical id 0: core ids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 1: core ids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 0: apicids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 1: apicids
256-263,272-279,288-295,304-311,320-327,336-343,352-359,368-375,384-391,400-407,416-423,432-439,448-455,4
64-471,480-487,496-503
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

```

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### Platform Notes (Continued)

```

CPU(s): 256
On-line CPU(s) list: 0-255
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9754 128-Core Processor
CPU family: 25
Model: 160
Thread(s) per core: 1
Core(s) per socket: 128
Socket(s): 2
Stepping: 2
Frequency boost: enabled
CPU max MHz: 3100.3411
CPU min MHz: 1500.0000
BogoMIPS: 4493.25
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
        clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
        constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf rapl
        pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
        popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
        abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext
        perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3
        invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1
        avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
        avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
        xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
        avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
        svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
        pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
        umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
        avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d

Virtualization: AMD-V
L1d cache: 8 MiB (256 instances)
L1i cache: 8 MiB (256 instances)
L2 cache: 256 MiB (256 instances)
L3 cache: 512 MiB (32 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-127
NUMA node1 CPU(s): 128-255
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB
        filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

| NAME | ONE-SIZE | ALL-SIZE | WAYS | TYPE        | LEVEL | SETS  | PHY-LINE | COHERENCY-SIZE |
|------|----------|----------|------|-------------|-------|-------|----------|----------------|
| L1d  | 32K      | 8M       | 8    | Data        | 1     | 64    | 1        | 64             |
| L1i  | 32K      | 8M       | 8    | Instruction | 1     | 64    | 1        | 64             |
| L2   | 1M       | 256M     | 8    | Unified     | 2     | 2048  | 1        | 64             |
| L3   | 16M      | 512M     | 16   | Unified     | 3     | 16384 | 1        | 64             |

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.  
available: 2 nodes (0-1)

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### Platform Notes (Continued)

```

node 0 cpus: 0-127
node 0 size: 386722 MB
node 0 free: 384097 MB
node 1 cpus: 128-255
node 1 size: 386800 MB
node 1 free: 386225 MB
node distances:
node  0  1
  0:  10  32
  1:  32  10

```

```

-----
9. /proc/meminfo
   MemTotal:      792087768 kB

```

```

-----
10. who -r
    run-level 3 May 14 19:58

```

```

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

```

```

-----
12. Services, from systemctl list-unit-files
    STATE      UNIT FILES
    enabled    YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
                issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
                smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
    enabled-runtime  systemd-remount-fs
    disabled      autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
                firewallld gpm grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd
                issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rdisc
                rpcbind rpmconfigcheck rsyncd sapconf serial-getty@ smartd_generate_opts snmpd snmptrapd
                sysstat systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                systemd-time-wait-sync systemd-timesyncd
    generated     ntp_sync
    indirect      uidd wickedd

```

```

-----
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=d602917c-fa5b-4f9c-b2fa-9b5cdd656491
    splash=silent
    mitigations=auto
    quiet
    security=apparmor

```

```

-----
14. cpupower frequency-info
    analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 2.25 GHz.
                        The governor "performance" may decide which speed to use
                        within this range.
    boost state support:
        Supported: yes
        Active: yes

```

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### Platform Notes (Continued)

-----  
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+madvise madvise never
enabled     [always] madvise never
hpage_pmd_size 2097152
shmem_enabled always within_size advise [never] deny force

```

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

```

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

```

-----  
18. OS release

```

From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4

```

-----  
19. Disk information

```

SPEC is set to: /home/cpu2017-1.1.9-amd-aocc400_znver4_A1
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       xfs   890G  24G  867G   3% /

```

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

```

Vendor:      Lenovo
Product:     ThinkSystem SR665 V3 MB,Genoa,Kauai,DDR5,Kauai,2U
Product Family: ThinkSystem
Serial:      1234567890

```

-----  
21. dmidecode

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section.

(Continued on next page)





# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology

ThinkSystem SR665 V3  
(2.25 GHz, AMD EPYC 9754)

SPECspeed®2017\_fp\_base = 426

SPECspeed®2017\_fp\_peak = 434

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

**Test Date:** May-2023  
**Hardware Availability:** Aug-2023  
**Software Availability:** Nov-2022

### 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:

5x SK Hynix HMC88AEBRA115N 32 GB 2 rank 4800  
19x SK Hynix HMC88AEBRA168N 32 GB 2 rank 4800

-----  
22. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: Lenovo  
BIOS Version: KAE111J-2.10  
BIOS Date: 05/11/2023  
BIOS Revision: 2.10  
Firmware Revision: 2.10

### Compiler Version Notes

=====  
C | 619.lbm\_s(base, peak) 638.imagick\_s(base, peak) 644.nab\_s(base, peak)  
-----

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin  
-----

=====  
C++, C, Fortran | 607.cactuBSSN\_s(base, peak)  
-----

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin  
-----

=====  
Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak) 654.roms\_s(base, peak)  
-----

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin  
-----

=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak) 628.pop2\_s(base, peak)  
-----

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#434 2022\_10\_28) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
-----

(Continued on next page)



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## Compiler Version Notes (Continued)

```

Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
-----

```

## Base Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Base Portability Flags

```

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

```

## Base Optimization Flags

C benchmarks:

```

-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3

```

(Continued on next page)



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## Lenovo Global Technology

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**Software Availability:** Nov-2022

## Base Optimization Flags (Continued)

C benchmarks (continued):

```
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc  
-lflang
```

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4  
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3  
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops  
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc  
-lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4  
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3  
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive  
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops  
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc  
-lflang
```

## Base Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Speed Result

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**Lenovo Global Technology**

SPECspeed®2017\_fp\_base = 426

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SPECspeed®2017\_fp\_peak = 434

**CPU2017 License:** 9017

**Test Date:** May-2023

**Test Sponsor:** Lenovo Global Technology

**Hardware Availability:** Aug-2023

**Tested by:** Lenovo Global Technology

**Software Availability:** Nov-2022

## Base Other Flags (Continued)

Benchmarks using both Fortran and C:

-Wno-return-type -Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-return-type -Wno-unused-command-line-argument

## Peak Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

619.lbm\_s: basepeak = yes

638.imagick\_s: basepeak = yes

644.nab\_s: basepeak = yes

Fortran benchmarks:

603.bwaves\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3

-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC\_OPENMP

-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math

(Continued on next page)



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## Peak Optimization Flags (Continued)

603.bwaves\_s (continued):

```
-fopenmp -Mrecursive -mllvm -reduce-array-computations=3
-fvector-transform -fscalar-transform -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang
```

649.fotonik3d\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -flto -Mrecursive
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang
```

654.roms\_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

627.cam4\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

628.pop2\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology

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SPECspeed®2017\_fp\_peak = 434

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2023

Hardware Availability: Aug-2023

Software Availability: Nov-2022

## Peak Optimization Flags (Continued)

628.pop2\_s (continued):

```
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=9
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -finline-aggressive -mllvm -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

## Peak Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Benchmarks using both Fortran and C:

```
-Wno-return-type -Wno-unused-command-line-argument
```

Benchmarks using Fortran, C, and C++:

```
-Wno-return-type -Wno-unused-command-line-argument
```

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

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

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

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Bergamo-S.xml>

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