



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR645 V3  
(3.55 GHz, AMD EPYC 9355)

SPECrate®2017\_int\_base = 952

SPECrate®2017\_int\_peak = 969

CPU2017 License: 9017

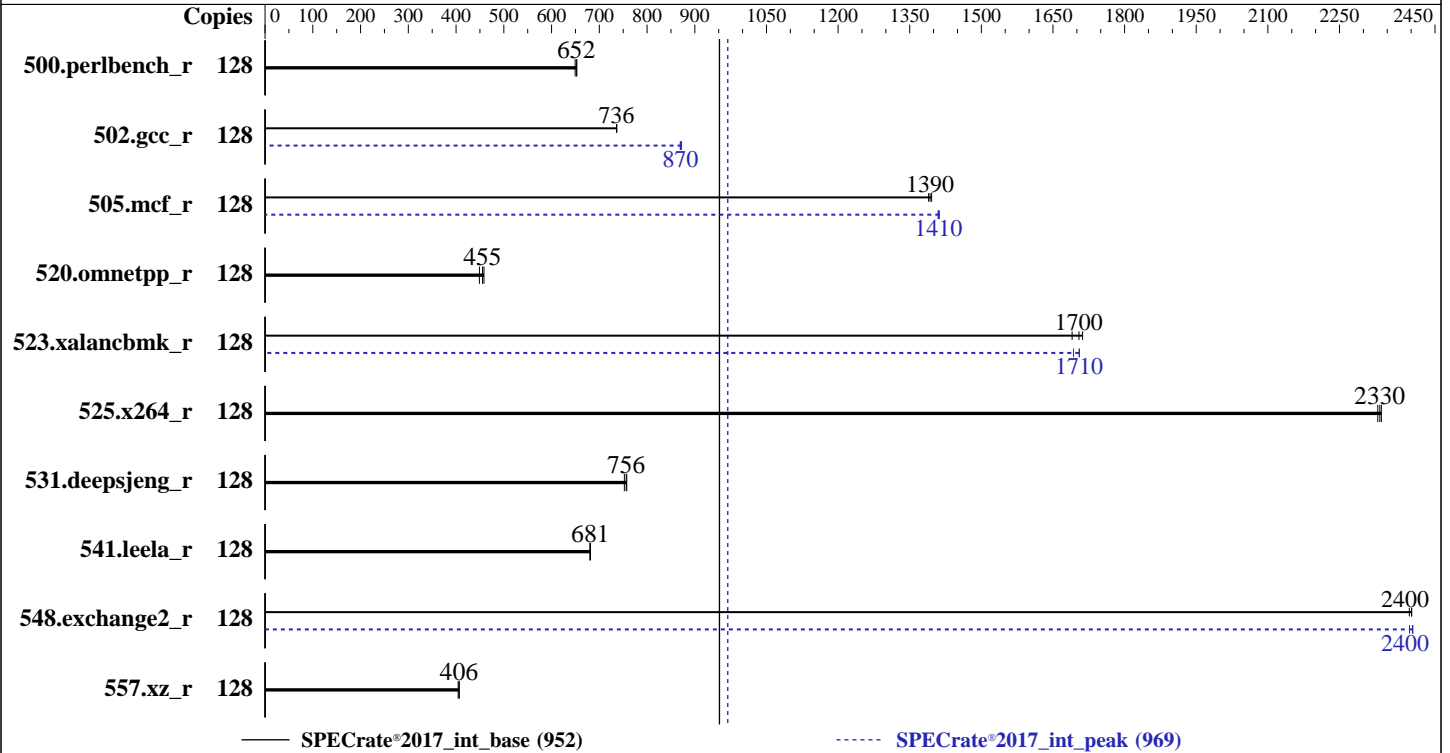
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Oct-2024

Hardware Availability: Nov-2024

Software Availability: Oct-2024



### Hardware

CPU Name: AMD EPYC 9355  
 Max MHz: 4400  
 Nominal: 3550  
 Enabled: 64 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 / 4 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: Air

### 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 KAE127C 5.10 released Sep-2024  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-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
500.perlbench_r	128	314	649	<b><u>313</u></b>	<b><u>652</u></b>	312	653	128	314	649	<b><u>313</u></b>	<b><u>652</u></b>	312	653
502.gcc_r	128	246	737	246	736	<b><u>246</u></b>	<b><u>736</u></b>	128	208	872	208	869	<b><u>208</u></b>	<b><u>870</u></b>
505.mcf_r	128	149	1390	148	1400	<b><u>149</u></b>	<b><u>1390</u></b>	128	146	1410	147	1410	<b><u>147</u></b>	<b><u>1410</u></b>
520.omnetpp_r	128	374	449	366	458	<b><u>369</u></b>	<b><u>455</u></b>	128	374	449	366	458	<b><u>369</u></b>	<b><u>455</u></b>
523.xalancbmk_r	128	80.0	1690	79.0	1710	<b><u>79.3</u></b>	<b><u>1700</u></b>	128	79.8	1690	<b><u>79.3</u></b>	<b><u>1710</u></b>	79.3	1710
525.x264_r	128	95.9	2340	96.2	2330	<b><u>96.0</u></b>	<b><u>2330</u></b>	128	95.9	2340	96.2	2330	<b><u>96.0</u></b>	<b><u>2330</u></b>
531.deepsjeng_r	128	<b><u>194</u></b>	<b><u>756</u></b>	195	752	194	757	128	<b><u>194</u></b>	<b><u>756</u></b>	195	752	194	757
541.leela_r	128	<b><u>311</u></b>	<b><u>681</u></b>	312	680	311	681	128	<b><u>311</u></b>	<b><u>681</u></b>	312	680	311	681
548.exchange2_r	128	140	2400	<b><u>140</u></b>	<b><u>2400</u></b>	140	2400	128	<b><u>140</u></b>	<b><u>2400</u></b>	140	2400	140	2400
557.xz_r	128	340	407	<b><u>340</u></b>	<b><u>406</u></b>	342	404	128	340	407	<b><u>340</u></b>	<b><u>406</u></b>	342	404

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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  
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.



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## 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/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017-1.1.9-amd-a
occ500_znver5_A1/amd_rate_aocc500_znver5_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk\_r peak run:

```
MALLOC_CONF = "thp:always"
```

## 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

NUMA Nodes per Socket set to NPS4

Sysinfo program /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on localhost Sat Oct 26 06:50:08 2024

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
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

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### Platform Notes (Continued)

```
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 (36cle09)
x86_64 x86_64 x86_64 GNU/Linux
```

```
-----
2. w
06:50:08 up 3:53, 1 user, load average: 38.70, 100.14, 117.15
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) 3094096
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) 3094096
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 ./Run025-compliant-amd-rateint.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 intrate
runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.189/temlogs/preenv.intrate.189.0.log --lognum 189.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-amd-aocc500_znver5_A1
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 9355 32-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 26
```

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### Platform Notes (Continued)

```

model          : 2
stepping       : 1
microcode      : 0xb002116
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 192 4K pages
cpu cores     : 32
siblings      : 64
2 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-3,8-11,16-19,24-27,32-35,40-43,48-51,56-59
physical id 1: core ids 0-3,8-11,16-19,24-27,32-35,40-43,48-51,56-59
physical id 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119
physical id 1: apicids 128-135,144-151,160-167,176-183,192-199,208-215,224-231,240-247

```

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):                128
On-line CPU(s) list:   0-127
Vendor ID:             AuthenticAMD
BIOS Vendor ID:       Advanced Micro Devices, Inc.
Model name:            AMD EPYC 9355 32-Core Processor
BIOS Model name:      AMD EPYC 9355 32-Core Processor
BIOS CPU family:      107
CPU family:            26
Model:                 2
Thread(s) per core:   2
Core(s) per socket:    32
Socket(s):             2
Stepping:              1
Frequency boost:       enabled
CPU(s) scaling MHz:    100%
CPU max MHz:           3550.0000
CPU min MHz:           1500.0000
BogoMIPS:              7089.71
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb
rdtscp lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid
extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid
sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm
cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
ibrs ibpb stibp ibrs_enhanced vmmcall fsgsbase tsc_adjust bmi1 avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local user_shstk 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_vpoptdq la57 rdpid bus_lock_detect

```

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### Platform Notes (Continued)

```
movdiri movdir64b overflow_recov succor smca fsrm avx512_vp2intersect  
flush_llid debug_swap  
AMD-V
```

```

Virtualization:
L1d cache:      3 MiB (64 instances)
L1i cache:      2 MiB (64 instances)
L2 cache:       64 MiB (64 instances)
L3 cache:       512 MiB (16 instances)
NUMA node(s):   8
NUMA node0 CPU(s): 0-7,64-71
NUMA node1 CPU(s): 8-15,72-79
NUMA node2 CPU(s): 16-23,80-87
NUMA node3 CPU(s): 24-31,88-95
NUMA node4 CPU(s): 32-39,96-103
NUMA node5 CPU(s): 40-47,104-111
NUMA node6 CPU(s): 48-55,112-119
NUMA node7 CPU(s): 56-63,120-127
Vulnerability Gather data sampling: Not affected
Vulnerability Itlb multihit:       Not affected
Vulnerability Lltf:                 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; PBR SB-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      3M    12 Data          1    64     1           64
L1i   32K      2M     8 Instruction    1    64     1           64
L2    1M       64M   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: 0-7,64-71
node 0 size: 96342 MB
node 0 free: 95733 MB
node 1 cpus: 8-15,72-79
node 1 size: 96725 MB
node 1 free: 95969 MB
node 2 cpus: 16-23,80-87
node 2 size: 96763 MB
node 2 free: 95851 MB
node 3 cpus: 24-31,88-95
node 3 size: 96763 MB
node 3 free: 96101 MB
node 4 cpus: 32-39,96-103
node 4 size: 96763 MB
node 4 free: 96079 MB
node 5 cpus: 40-47,104-111
node 5 size: 96763 MB

```

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### Platform Notes (Continued)

```

node 5 free: 96133 MB
node 6 cpus: 48-55,112-119
node 6 size: 96763 MB
node 6 free: 96076 MB
node 7 cpus: 56-63,120-127
node 7 size: 96664 MB
node 7 free: 95958 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:      792115720 kB

```

```

10. who -r
run-level 3 Oct 26 02:57

```

```

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 systcl-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 ipmievd 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

```

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### Platform Notes (Continued)

```
analyzing CPU 122:
  current policy: frequency should be within 1.50 GHz and 3.55 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
```

```
-----
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 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
Filesystem      Type Size Used Avail Use% Mounted on
```

(Continued on next page)





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### Platform Notes (Continued)

/dev/sda3      xfs    442G    87G    356G    20% /

-----  
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. 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 HMC88AHBRA471N 32 GB 2 rank 6400, configured at 6000  
  2x SK Hynix HMC88AHBRA472N 32 GB 2 rank 6400, configured at 6000  
  10x SK Hynix HMC88AHBRA478N 32 GB 2 rank 6400, configured at 6000  
-----

23. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor:        Lenovo  
BIOS Version:       KAE127C-5.10  
BIOS Date:          09/18/2024  
BIOS Revision:      5.10  
Firmware Revision: 53.9  
-----

### Compiler Version Notes

=====  
C            | 502.gcc\_r(peak)  
-----

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
-----

=====  
C            | 500.perlbench\_r(base, peak) 502.gcc\_r(base) 505.mcf\_r(base, peak) 525.x264\_r(base, peak)  
557.xz\_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            | 502.gcc\_r(peak)  
-----

AMD clang version 17.0.6 (CLANG: AOCC\_5.0.0-Build#1316 2024\_09\_09)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin  
-----

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# SPEC CPU®2017 Integer Rate Result

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## Lenovo Global Technology

ThinkSystem SR645 V3  
(3.55 GHz, AMD EPYC 9355)

SPECrate®2017\_int\_base = 952

SPECrate®2017\_int\_peak = 969

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Oct-2024

Hardware Availability: Nov-2024

Software Availability: Oct-2024

## Compiler Version Notes (Continued)

```
=====
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
  | 557.xz_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++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
    | 541.leela_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 | 548.exchange2_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
=====
```

## Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

## Base Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
```

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Software Availability: Oct-2024

## Base Portability Flags (Continued)

531.deepsjeng\_r: -DSPEC\_LP64  
541.leela\_r: -DSPEC\_LP64  
548.exchange2\_r: -DSPEC\_LP64  
557.xz\_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
-Wl,-mllvm -Wl,-extra-inliner -z muldefs -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 -lflang
-lamdalloc-ext -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,-do-block-reorder=advanced -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -fno-PIE -no-pie
-fvirtual-function-elimination -fvisibility=hidden
-mllvm -do-block-reorder=advanced -lamdlibm -lflang -lamdalloc-ext
-ldl
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto
-fepilog-vectorization-of-inductions -mllvm -optimize-strided-mem-cost
-floop-transform -mllvm -unroll-aggressive -mllvm -unroll-threshold=500
-lamdlibm -lflang -lamdalloc -ldl
```



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SPECrate®2017\_int\_peak = 969

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2024

**Hardware Availability:** Nov-2024

**Software Availability:** Oct-2024

## Base Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

## Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

## Peak Portability Flags

500.perlbench\_r: -DSPEC\_LINUX\_X64 -DSPEC\_LP64

502.gcc\_r: -D\_FILE\_OFFSET\_BITS=64

505.mcf\_r: -DSPEC\_LP64

520.omnetpp\_r: -DSPEC\_LP64

523.xalancbmk\_r: -DSPEC\_LINUX -DSPEC\_LP64

525.x264\_r: -DSPEC\_LP64

531.deepsjeng\_r: -DSPEC\_LP64

541.leela\_r: -DSPEC\_LP64

548.exchange2\_r: -DSPEC\_LP64

557.xz\_r: -DSPEC\_LP64

## Peak Optimization Flags

C benchmarks:

500.perlbench\_r: basepeak = yes

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**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2024

**Hardware Availability:** Nov-2024

**Software Availability:** Oct-2024

## Peak Optimization Flags (Continued)

```
502.gcc_r: -m32 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Wl,-mllvm -Wl,-extra-inliner
-z muldefs -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 -fgnu89-inline
-lamdalloc
```

```
505.mcf_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-extra-inliner -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
-lflang -lamdalloc-ext -ldl
```

525.x264\_r: basepeak = yes

557.xz\_r: basepeak = yes

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

```
523.xalancbmk_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=advanced -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-mllvm -do-block-reorder=advanced -lamdlibm -lflang
-lamdalloc-ext -ldl
```

531.deepsjeng\_r: basepeak = yes

541.leela\_r: basepeak = yes

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver5 -fveclib=AMDLIBM
```

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**Hardware Availability:** Nov-2024

**Software Availability:** Oct-2024

## Peak Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-ffast-math -flto -fepilog-vectorization-of-inductions
-mlvm -optimize-strided-mem-cost -floop-transform
-mlvm -unroll-aggressive -mlvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc -ldl
```

## Peak Other Flags

C benchmarks (except as noted below):

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

```
502.gcc_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc5/1316/amd_rate_aocc500_znver5_A_lib/lib32
```

C++ benchmarks:

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

Fortran benchmarks:

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

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