



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology ThinkSystem ST45 V3 (4.70 GHz, AMD EPYC 4464P)

SPECrate®2017\_int\_base = 133

SPECrate®2017\_int\_energy\_base = 1540

SPECrate®2017\_int\_peak = 137

SPECrate®2017\_int\_energy\_peak = 1580

CPU2017 License: 9017

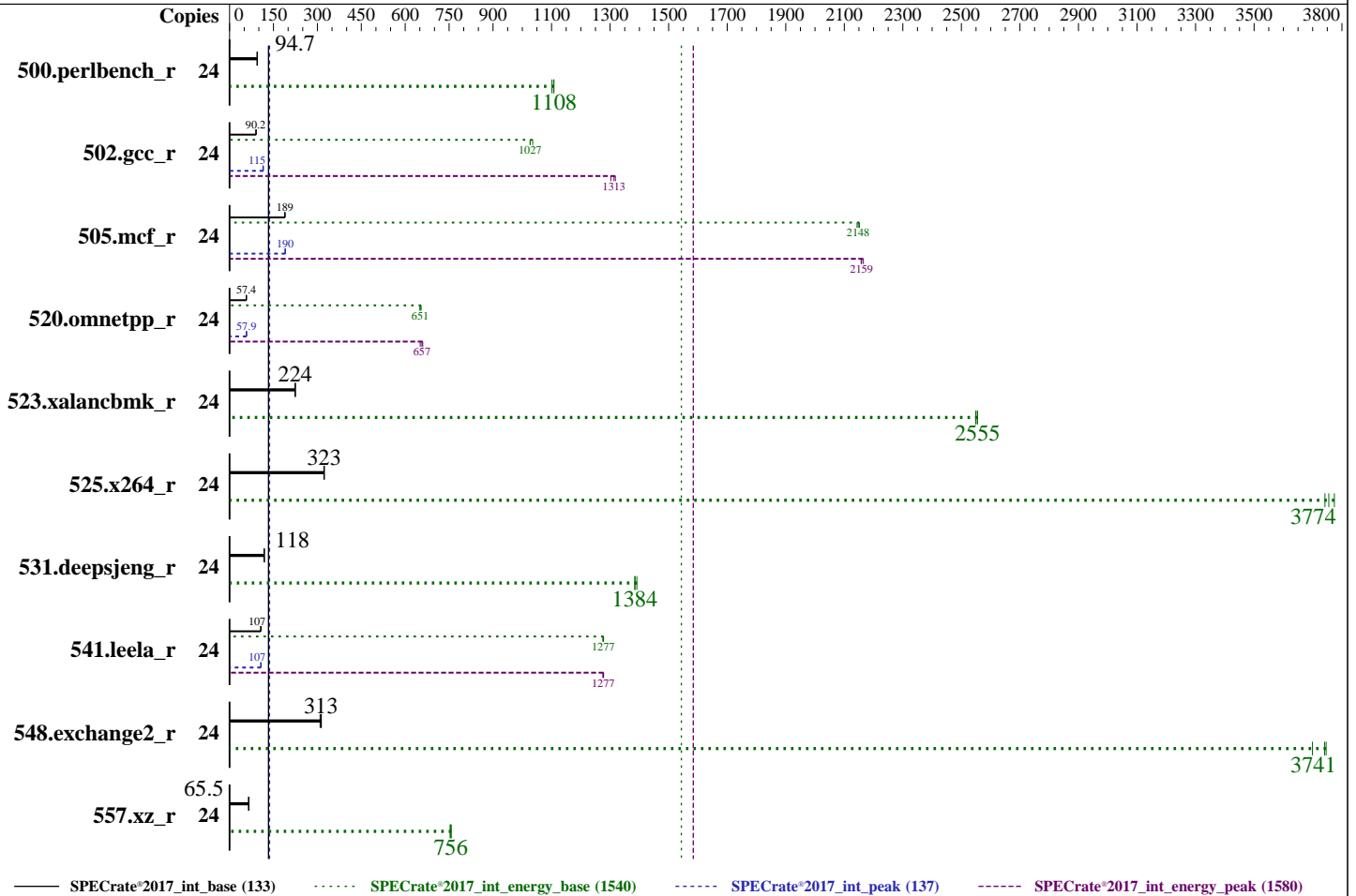
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Oct-2024

Hardware Availability: Dec-2024

Software Availability: Oct-2024



### Hardware

CPU Name: AMD EPYC 4464P  
 Max MHz: 5600  
 Nominal: 4700  
 Enabled: 12 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 64 MB I+D on chip per chip,  
 32 MB shared / 6 cores  
 Other: None  
 Memory: 64 GB (2 x 32 GB 2Rx8 PC5-5600B-E, running at 5200)  
 Storage: 1 x 960GB 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 QIE101S 1.10 released Aug-2024  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 Other: None  
 Power Management: OS set to balance power and performance



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### Power

Max. Power (W): 97.98  
Idle Power (W): 29.85  
Min. Temperature (C): 24.06  
Elevation (m): 43  
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
Provisioning: Line-powered

### Power Settings

Management FW: None  
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 300 W (non-redundant)  
Details: ATX-300W Power Supply  
BMFL  
Backplane: None  
Other Storage: None  
Storage Model #: 4XB7A82275  
NICs Installed: 1 x ThinkSystem 2-port embedded @ 1 Gb  
NICs Enabled (FW/OS): 2 / 1  
NICs Connected/Speed: 1 @ 1 Gb  
Other HW Model #: Two fixed system fans (front drive bay and rear)

### Power Analyzer

Power Analyzer: WIN:9888  
Hardware Vendor: YOKOGAWA, Inc.  
Model: YokogawaWT310E  
Serial Number: C3SH31009E  
Input Connection: Default  
Metrology Institute: CNAS  
Calibration By: CEPREI Calibration and Testing Centre  
Calibration Label: 1GA24011968-0005  
Calibration Date: 27-Sep-2024  
PTDaemon® Version: 1.10.0 (82175bac; 2022-08-17)  
Setup Description: Connected to PSU1  
Current Ranges Used: 1A  
Voltage Range Used: 300V

### Temperature Meter

Temperature Meter: WIN:9889  
Hardware Vendor: Digi International, Inc.  
Model: DigiWATCHPORT\_H  
Serial Number: W62330940  
Input Connection: USB  
PTDaemon Version: 1.10.0 (82175bac; 2022-08-17)  
Setup Description: 50 mm in front of SUT main intake

## Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
500.peribench_r	24	<b>404</b>	<b>94.7</b>	<b>37.4</b>	<b>1110</b>	<b>92.7</b>	<b>94.3</b>	403	94.8	37.4	1110	92.9	94.5	406	94.1	37.6	1100	92.8	95.2
502.gcc_r	24	<b>377</b>	<b>90.2</b>	<b>35.9</b>	<b>1030</b>	<b>95.3</b>	<b>97.0</b>	374	90.9	35.6	1040	95.3	96.8	377	90.1	35.9	1030	95.3	96.8
505.mcf_r	24	205	190	19.7	2150	96.4	97.3	205	189	19.8	2140	96.3	97.4	<b>205</b>	<b>189</b>	<b>19.8</b>	<b>2150</b>	<b>96.3</b>	<b>97.4</b>
520.omnetpp_r	24	547	57.6	52.1	654	95.3	96.5	<b>549</b>	<b>57.4</b>	<b>52.4</b>	<b>651</b>	<b>95.4</b>	<b>96.7</b>	550	57.2	52.4	650	95.3	97.2
523.xalancbmk_r	24	113	225	10.7	2550	95.2	96.7	113	224	10.8	2550	95.0	96.9	<b>113</b>	<b>224</b>	<b>10.7</b>	<b>2560</b>	<b>95.1</b>	<b>96.9</b>
525.x264_r	24	<b>130</b>	<b>323</b>	<b>12.1</b>	<b>3770</b>	<b>92.8</b>	<b>95.8</b>	130	324	12.1	3760	93.4	96.9	130	322	12.2	3740	93.4	96.5
531.deepsjeng_r	24	233	118	21.6	1380	92.8	95.8	232	119	21.5	1390	92.8	96.5	<b>232</b>	<b>118</b>	<b>21.6</b>	<b>1380</b>	<b>93.0</b>	<b>96.5</b>
541.leela_r	24	<b>372</b>	<b>107</b>	<b>33.7</b>	<b>1280</b>	<b>90.5</b>	<b>91.7</b>	372	107	33.7	1280	90.7	91.8	372	107	33.7	1280	90.4	91.5
548.exchange2_r	24	201	314	18.2	3750	90.7	92.3	<b>201</b>	<b>313</b>	<b>18.2</b>	<b>3740</b>	<b>90.6</b>	<b>91.7</b>	203	309	18.4	3700	90.6	92.1
557.xz_r	24	397	65.2	37.4	753	94.2	95.3	395	65.6	37.2	757	94.2	95.4	<b>396</b>	<b>65.5</b>	<b>37.3</b>	<b>756</b>	<b>94.2</b>	<b>95.5</b>

SPECrate®2017\_int\_base = 133

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### Peak Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
500.perlbench_r	24	<b>404</b>	<b>94.7</b>	<b>37.4</b>	<b>1110</b>	<b>92.7</b>	<b>94.3</b>	403	94.8	37.4	1110	92.9	94.5	406	94.1	37.6	1100	92.8	95.2
502.gcc_r	24	298	114	28.3	1300	95.0	96.4	<b>296</b>	<b>115</b>	<b>28.1</b>	<b>1310</b>	<b>95.1</b>	<b>96.4</b>	295	115	28.0	1320	95.1	96.5
505.mcf_r	24	<b>204</b>	<b>190</b>	<b>19.6</b>	<b>2160</b>	<b>96.3</b>	<b>97.4</b>	203	191	19.6	2170	96.4	97.3	204	190	19.7	2160	96.3	97.3
520.omnetpp_r	24	549	57.3	52.4	651	95.3	96.5	541	58.2	51.7	660	95.4	98.0	<b>544</b>	<b>57.9</b>	<b>51.9</b>	<b>657</b>	<b>95.3</b>	<b>96.4</b>
523.xalancbmk_r	24	113	225	10.7	2550	95.2	96.7	113	224	10.8	2550	95.0	96.9	<b>113</b>	<b>224</b>	<b>10.7</b>	<b>2560</b>	<b>95.1</b>	<b>96.9</b>
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### 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.



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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"
```

## 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

Sysinfo program /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost Fri Oct 18 11:46:55 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
  21. /sys/devices/virtual/dmi/id
  22. dmidecode
  23. BIOS
- 

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## Platform Notes (Continued)

- 
- 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
  - w  
11:46:55 up 21:41, 1 user, load average: 0.31, 0.93, 4.40  
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT  
root pts/0 172.30.81.2 Thu14 20:41m 1.20s 0.05s /bin/bash ./amd\_rate\_aocc500\_znver5\_A1.sh
  - Username  
From environment variable \$USER: root
  - 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) 253418  
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) 253418  
virtual memory (kbytes, -v) unlimited  
file locks (-x) unlimited
  - 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@pts/0  
-bash  
/bin/bash ./03.local\_run\_SPECcpu.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 --power --config amd\_rate\_aocc500\_znver5\_A1.cfg --tune all --reportable --iterations 3 intrate  
runcpu --power --configfile amd\_rate\_aocc500\_znver5\_A1.cfg --tune all --reportable --iterations 3 --runmode  
rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile  
\$SPEC/tmp/CPU2017.064/templogs/preenv.intrate.064.0.log --lognum 064.0 --from\_runcpu 2  
specperl \$SPEC/bin/sysinfo  
\$SPEC = /home/cpu2017-1.1.9-amd-aocc500\_znver5\_A1
  - /proc/cpuinfo  
model name : AMD EPYC 4464P 12-Core Processor  
vendor\_id : AuthenticAMD

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## Platform Notes (Continued)

cpu family : 25  
model : 97  
stepping : 2  
microcode : 0xa601206  
bugs : sysret\_ss\_attrs spectre\_v1 spectre\_v2 spec\_store\_bypass rsro  
TLB size : 3584 4K pages  
cpu cores : 12  
siblings : 24  
1 physical ids (chips)  
24 processors (hardware threads)  
physical id 0: core ids 0-5,8-13  
physical id 0: apicids 0-11,16-27

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: 48 bits physical, 48 bits virtual
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 4464P 12-Core Processor
BIOS Model name: AMD EPYC 4464P 12-Core Processor
BIOS CPU family: 107
CPU family: 25
Model: 97
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 1
Stepping: 2
Frequency boost: enabled
CPU(s) scaling MHz: 55%
CPU max MHz: 5481.3472
CPU min MHz: 3000.0000
BogoMIPS: 7385.66
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
sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm
cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
ibrs ibpb stibp ibrs_enhanced vmmcall fsgsbase bmi1 avx2 smep bmi2
invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
user_shstk avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd 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
```

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### Platform Notes (Continued)

```

vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid
overflow_recov succor smca flush_llid
AMD-V
L1d cache: 384 KiB (12 instances)
L1i cache: 384 KiB (12 instances)
L2 cache: 12 MiB (12 instances)
L3 cache: 64 MiB (2 instances)
NUMA node(s): 1
NUMA node0 CPU(s): 0-23
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: Mitigation; Safe RET
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 32K 384K 8 Data 1 64 1 64
L1i 32K 384K 8 Instruction 1 64 1 64
L2 1M 12M 8 Unified 2 2048 1 64
L3 32M 64M 16 Unified 3 32768 1 64

```

```

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0-23
node 0 size: 63404 MB
node 0 free: 62787 MB
node distances:
node 0
0: 10

```

```

9. /proc/meminfo
MemTotal: 64926696 kB

```

```

10. who -r
run-level 3 Oct 17 14:06

```

```

11. Systemd service manager version: systemd 254 (254.10+suse.84.ge8d77af424)
Default Target Status
multi-user running

```

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Software Availability: Oct-2024

### Platform Notes (Continued)

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 smartd sshd 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 chrynd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info firewallld fsidd gpm grub2-once haveged hwloc-dump-hwdata ipmi ipmievdl issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures systemd-confext systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
generated	ntp_sync
indirect	systemd-userdbd wickedd

13. Linux kernel boot-time arguments, from `/proc/cmdline`

```

BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.21-default
root=UUID=89a766c1-c11a-42be-be76-94e9ae8b20b1
splash=silent
mitigations=auto
quiet
security=apparmor

```

14. `cpupower frequency-info`

```

analyzing CPU 13:
  current policy: frequency should be within 3.00 GHz and 3.70 GHz.
                  The governor "conservative" may decide which speed to use
                  within this range.

  boost state support:
    Supported: yes
    Active: yes

```

15. `tuned-adm active`

Current active profile: desktop

16. `sysctl`

kernel.numa_balancing	0
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

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**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2024  
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## Platform Notes (Continued)

```
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
/dev/sda3       xfs   893G   94G  800G  11% /
```

```
-----
21. /sys/devices/virtual/dmi/id
Vendor:         LENOVO
Product:        ThinkSystem ST45 V3
Product Family: ThinkSystem
Serial:         INVALID
```

```
-----
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:
  2x SK Hynix HMC88AGBEA084N 32 GB 2 rank 5600, configured at 5200
```

```
-----
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      LENOVO
BIOS Version:     QIE101S-1.10
BIOS Date:        08/28/2024
BIOS Revision:    1.10
Firmware Revision: 12.65
```

(Continued on next page)



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## Platform Notes (Continued)

ST45 V3 CPU performance result based on 65W maximum consumption limit.

## 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  
=====

=====  
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)  
=====

(Continued on next page)



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**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

## 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  
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

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**Hardware Availability:** Dec-2024

**Software Availability:** Oct-2024

## Base Optimization Flags (Continued)

C benchmarks (continued):

-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

## 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

(Continued on next page)



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CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Oct-2024

Hardware Availability: Dec-2024

Software Availability: Oct-2024

## Peak Compiler Invocation (Continued)

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

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
-fremap-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
```

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## Peak Optimization Flags (Continued)

505.mcf\_r (continued):

```
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7  
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining  
-mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3 -zopt -lamdlibm  
-lflang -lamdalloc-ext -ldl
```

525.x264\_r: basepeak = yes

557.xz\_r: basepeak = yes

C++ benchmarks:

```
520.omnetpp_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 -fno-PIE  
-no-pie -fvirtual-function-elimination -fvisibility=hidden  
-mllvm -do-block-reorder=advanced -lamdlibm -lamdalloc-ext  
-ldl
```

523.xalancbmk\_r: basepeak = yes

531.deepsjeng\_r: basepeak = yes

```
541.leela_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 -fno-PIE  
-no-pie -fvirtual-function-elimination -fvisibility=hidden  
-mllvm -do-block-reorder=advanced -lamdlibm -lflang  
-lamdalloc-ext -ldl
```

Fortran benchmarks:

548.exchange2\_r: basepeak = yes



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## 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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