



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR645 V3
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_int_base = 16.6

SPECspeed®2017_int_peak = 16.8

CPU2017 License: 9017

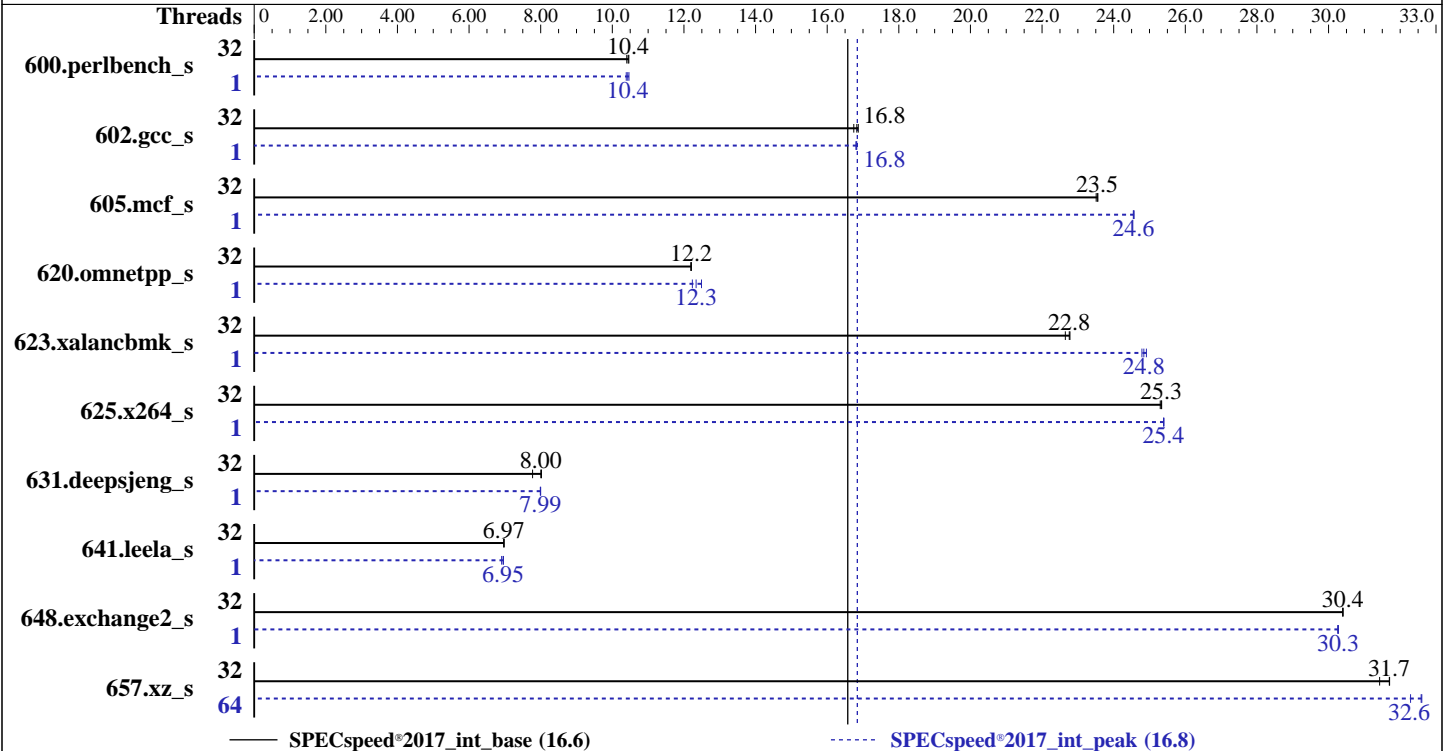
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Apr-2024

Hardware Availability: Feb-2023

Software Availability: Nov-2022



Hardware

CPU Name: AMD EPYC 9174F
 Max MHz: 4400
 Nominal: 4100
 Enabled: 32 cores, 2 chips, 2 threads/core
 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,
 32 MB shared / 2 cores
 Other: None
 Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
 Storage: 1 x 480 GB SATA SSD
 Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP4
 Kernel 5.14.21-150400.22-default
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: Yes
 Firmware: Lenovo BIOS Version KAE117M 4.11 released Feb-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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	171	10.4	170	10.5	170	10.4	1	170	10.4	170	10.5	171	10.4
602.gcc_s	32	236	16.9	237	16.8	238	16.7	1	237	16.8	237	16.8	237	16.8
605.mcf_s	32	201	23.5	200	23.6	201	23.5	1	192	24.6	192	24.6	192	24.5
620.omnetpp_s	32	134	12.2	134	12.2	134	12.2	1	131	12.5	133	12.2	132	12.3
623.xalancbmk_s	32	62.2	22.8	62.3	22.8	62.6	22.6	1	57.2	24.8	56.9	24.9	57.0	24.8
625.x264_s	32	69.6	25.3	69.6	25.3	69.7	25.3	1	69.5	25.4	69.5	25.4	69.4	25.4
631.deepsjeng_s	32	184	7.77	179	8.02	179	8.00	1	179	7.99	179	8.00	179	7.99
641.leela_s	32	245	6.97	245	6.98	245	6.97	1	245	6.96	245	6.95	247	6.91
648.exchange2_s	32	96.7	30.4	96.7	30.4	96.7	30.4	1	97.2	30.3	97.1	30.3	97.1	30.3
657.xz_s	32	197	31.4	195	31.7	195	31.7	64	191	32.3	190	32.6	190	32.6

SPECspeed®2017_int_base = **16.6**

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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.



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Environment Variables Notes

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

```
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/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 = "64"
```

Environment variables set by runcpu during the 600.perlbench_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 602.gcc_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 605.mcf_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 620.omnetpp_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 623.xalancbmk_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 625.x264_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 631.deepsjeng_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 641.leela_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 648.exchange2_s peak run:

```
GOMP_CPU_AFFINITY = "15"
```

Environment variables set by runcpu during the 657.xz_s peak run:

```
GOMP_CPU_AFFINITY = "0-63"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "8"
```

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 and then set it to Custom Mode

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Platform Notes (Continued)

NUMA Nodes per Socket set to NPS4
Periodic Directory Rinse (PDR) Tuning set to Cache-Bound

Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Tue Apr 9 10:53:22 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 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
10:53:22 up 3 min, 1 user, load average: 0.33, 0.33, 0.15
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 10:51 9.00s 0.93s 0.04s /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) 3094772
max locked memory (kbytes, -l) 2097152
max memory size (kbytes, -m) unlimited
```

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Platform Notes (Continued)

```

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) 3094772
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_SR645V3_bergamo.sh
/bin/bash ./Run035-compliant-amd-speedint.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 intspeak
runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode speed --tune base:peak --size test:train:refspeed intspeak --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.332/temlogs/preenv.intspeak.332.0.log --lognum 332.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2

```

6. /proc/cpuinfo

```

model name      : AMD EPYC 9174F 16-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 17
stepping       : 1
microcode      : 0xa101144
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 3584 4K pages
cpu cores      : 16
siblings       : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
physical id 1: core ids 0-1,8-9,16-17,24-25,32-33,40-41,48-49,56-57
physical id 0: apicids 0-3,16-19,32-35,48-51,64-67,80-83,96-99,112-115
physical id 1: apicids 128-131,144-147,160-163,176-179,192-195,208-211,224-227,240-243
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
CPU(s):                 64
On-line CPU(s) list:   0-63
Vendor ID:              AuthenticAMD
Model name:             AMD EPYC 9174F 16-Core Processor
CPU family:             25

```

(Continued on next page)



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Platform Notes (Continued)

```

Model: 17
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4408.2998
CPU min MHz: 1500.0000
BogoMIPS: 8187.68
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 bpeext 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: 1 MiB (32 instances)
L1i cache: 1 MiB (32 instances)
L2 cache: 32 MiB (32 instances)
L3 cache: 512 MiB (16 instances)
NUMA node(s): 16
NUMA node0 CPU(s): 0,1,32,33
NUMA node1 CPU(s): 2,3,34,35
NUMA node2 CPU(s): 4,5,36,37
NUMA node3 CPU(s): 6,7,38,39
NUMA node4 CPU(s): 8,9,40,41
NUMA node5 CPU(s): 10,11,42,43
NUMA node6 CPU(s): 12,13,44,45
NUMA node7 CPU(s): 14,15,46,47
NUMA node8 CPU(s): 16,17,48,49
NUMA node9 CPU(s): 18,19,50,51
NUMA node10 CPU(s): 20,21,52,53
NUMA node11 CPU(s): 22,23,54,55
NUMA node12 CPU(s): 24,25,56,57
NUMA node13 CPU(s): 26,27,58,59
NUMA node14 CPU(s): 28,29,60,61
NUMA node15 CPU(s): 30,31,62,63
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: 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 always-on, 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

(Continued on next page)



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Platform Notes (Continued)

L1d	32K	1M	8 Data	1	64	1	64
L1i	32K	1M	8 Instruction	1	64	1	64
L2	1M	32M	8 Unified	2	2048	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: 0-1,32-33

node 0 size: 48046 MB

node 0 free: 47532 MB

node 1 cpus: 2-3,34-35

node 1 size: 48382 MB

node 1 free: 48248 MB

node 2 cpus: 4-5,36-37

node 2 size: 48382 MB

node 2 free: 48049 MB

node 3 cpus: 6-7,38-39

node 3 size: 48382 MB

node 3 free: 48235 MB

node 4 cpus: 8-9,40-41

node 4 size: 48382 MB

node 4 free: 48260 MB

node 5 cpus: 10-11,42-43

node 5 size: 48382 MB

node 5 free: 48273 MB

node 6 cpus: 12-13,44-45

node 6 size: 48382 MB

node 6 free: 48171 MB

node 7 cpus: 14-15,46-47

node 7 size: 48382 MB

node 7 free: 48222 MB

node 8 cpus: 16-17,48-49

node 8 size: 48382 MB

node 8 free: 48276 MB

node 9 cpus: 18-19,50-51

node 9 size: 48382 MB

node 9 free: 48304 MB

node 10 cpus: 20-21,52-53

node 10 size: 48382 MB

node 10 free: 48303 MB

node 11 cpus: 22-23,54-55

node 11 size: 48382 MB

node 11 free: 48295 MB

node 12 cpus: 24-25,56-57

node 12 size: 48382 MB

node 12 free: 48305 MB

node 13 cpus: 26-27,58-59

node 13 size: 48382 MB

node 13 free: 48316 MB

node 14 cpus: 28-29,60-61

node 14 size: 48382 MB

node 14 free: 48020 MB

node 15 cpus: 30-31,62-63

node 15 size: 48310 MB

node 15 free: 48241 MB

node distances:

node	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0:	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

(Continued on next page)



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Platform Notes (Continued)

```

1: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
2: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
3: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
4: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
5: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
6: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
7: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
8: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
9: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
10: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
11: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
12: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
13: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
14: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
15: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20

```

```

-----
9. /proc/meminfo
   MemTotal:      792286352 kB

```

```

-----
10. who -r
    run-level 3 Apr 9 10:51

```

```

-----
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                             autofsd autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                                     chronyd console-getty cups cups-browsed debug-shell dmraid-activation 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 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                             wickedd

```

```

-----
13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=3bd1de87-9e70-472e-8edf-b06ab6b3800b
splash=silent
mitigations=auto
quiet
security=apparmor

```

```

-----
14. cpupower frequency-info
    analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 4.10 GHz.
                       The governor "performance" may decide which speed to use

```

(Continued on next page)



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Platform Notes (Continued)

within this range.

boost state support:

Supported: yes

Active: yes

```

-----
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 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-A1.2
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       xfs   442G  176G  267G  40% /

-----
20. /sys/devices/virtual/dmi/id
Vendor:          Lenovo
Product:         ThinkSystem SR645 V3 MB,Genoa,DDR5,Oahu,1U
Product Family: ThinkSystem

```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology

ThinkSystem SR645 V3
(4.10 GHz, AMD EPYC 9174F)

SPECspeed®2017_int_base = 16.6

SPECspeed®2017_int_peak = 16.8

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

Test Date: Apr-2024
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Platform Notes (Continued)

Serial: 1234567890

21. dmidecode

Additional information from dmidecode 3.2 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:

4x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
9x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
7x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
4x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

22. BIOS

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

BIOS Vendor: Lenovo
BIOS Version: KAE117M-4.11
BIOS Date: 02/29/2024
BIOS Revision: 4.11
Firmware Revision: 2.16

Compiler Version Notes

C | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
| 657.xz_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++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
| 641.leela_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 | 648.exchange2_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



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CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

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Test Date: Apr-2024

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Software Availability: Nov-2022

Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Base Portability Flags

```
600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```

Base Optimization Flags

C benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lflang
-lamdalloc
```

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
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden -fopenmp=libomp
```

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Base Optimization Flags (Continued)

C++ benchmarks (continued):

-lomp -lamdlibm -lflang -lamdalloc-ext

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=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flt0 -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc

Base Other Flags

C benchmarks:

-Wno-return-type -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

Same as Base Portability Flags



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Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -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
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

```
602.gcc_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -z muldefs -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
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

605.mcf_s: Same as 600.perlbench_s

625.x264_s: Same as 600.perlbench_s

657.xz_s: Same as 600.perlbench_s

C++ benchmarks:

```
620.omnetpp_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden
-fopenmp=libomp -lomp -lamdlibm -lamdalloc-ext -lflang
```

```
623.xalancbmk_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
```

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Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):

```
-fopenmp=libomp -lomp -lamdlibm -lamdalloc-ext -lflang
```

631.deepsjeng_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

641.leela_s: Same as 631.deepsjeng_s

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=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang
```

Peak Other Flags

C benchmarks:

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

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-Genoa-U.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.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-Genoa-U.xml>

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Tested with SPEC CPU®2017 v1.1.9 on 2024-04-08 22:53:21-0400.
Report generated on 2024-05-07 22:19:16 by CPU2017 PDF formatter v6716.
Originally published on 2024-05-07.