## Lenovo Global Technology

**ThinkSystem SR635 V3**

(CPU: 3.25 GHz, AMD EPYC 9354P)

| SPECspeed®2017_fp_base = 235 | SPECspeed®2017_fp_peak = 250 |

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### Hardware

**CPU Name:** AMD EPYC 9354P  
**Max MHz:** 3800  
**Nominal:** 3250  
**Enabled:** 32 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:** 256 MB I+D on chip per chip, 32 MB shared / 4 cores  
**Other:** None  
**Memory:** 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)  
**Storage:** 1 x 480 GB SATA SSD  
**Other:** None

### 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 KAE109A 1.40 released Jan-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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### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>32 Core</th>
<th>64 Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwaves_s</td>
<td>343</td>
<td>333</td>
</tr>
<tr>
<td>cactuBSSN_s</td>
<td>148</td>
<td>353</td>
</tr>
<tr>
<td>lbm_s</td>
<td>233</td>
<td>237</td>
</tr>
<tr>
<td>wrf_s</td>
<td>131</td>
<td>103</td>
</tr>
<tr>
<td>cam4_s</td>
<td>257</td>
<td>354</td>
</tr>
<tr>
<td>pop2_s</td>
<td>147</td>
<td>401</td>
</tr>
<tr>
<td>imagick_s</td>
<td>314</td>
<td>334</td>
</tr>
</tbody>
</table>

---

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>32 Core</th>
<th>64 Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwaves_s</td>
<td>343</td>
<td>333</td>
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<tr>
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<td>lbm_s</td>
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<tr>
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<td>103</td>
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<td>354</td>
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<tr>
<td>pop2_s</td>
<td>147</td>
<td>401</td>
</tr>
<tr>
<td>imagick_s</td>
<td>314</td>
<td>334</td>
</tr>
</tbody>
</table>
**SPEC CPU®2017 Floating Point Speed Result**

**Lenovo Global Technology**
ThinkSystem SR635 V3 (3.25 GHz, AMD EPYC 9354P)

**SPECspeed®2017_fp_base = 235**

**SPECspeed®2017_fp_peak = 250**

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>67.5</td>
<td>874</td>
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<td>876</td>
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<td>878</td>
<td>67.1</td>
<td>67.4</td>
<td>331</td>
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<td>67.3</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>48.6</td>
<td>343</td>
<td>50.3</td>
<td>331</td>
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<td>47.6</td>
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<td>47.3</td>
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<tr>
<td>619.ibm_s</td>
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<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<td>67.4</td>
<td>132</td>
<td>67.4</td>
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<tr>
<td>628.pop2_s</td>
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<td>102</td>
<td>117</td>
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<td>115</td>
<td>115</td>
<td>103</td>
<td>103</td>
<td>115</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>62.2</td>
<td>232</td>
<td>62.2</td>
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<td>63.3</td>
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<td>56.2</td>
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<tr>
<td>644.nab_s</td>
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<td>43.6</td>
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<td>401</td>
<td>401</td>
<td>43.6</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>62.0</td>
<td>147</td>
<td>62.0</td>
<td>147</td>
<td>61.9</td>
<td>147</td>
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<td>147</td>
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<tr>
<td>654.roms_s</td>
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<td>47.1</td>
<td>47.3</td>
<td>333</td>
<td>333</td>
<td>47.3</td>
</tr>
</tbody>
</table>

**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 filesystem layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

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Operating System Notes (Continued)

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, 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:
'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 = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-amd-aocc400-genoa-Ble/amd_speed_aocc400_genoa_B_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 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-63"

(Continued on next page)
## Environment Variables Notes (Continued)

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

## 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

Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-genoa-B1e/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Feb 16 19:11:45 2023

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

---

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9. /proc/meminfo
10. who -r

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## Lenovo Global Technology

### SPEC CPU 2017 Floating Point Speed Result

- **Test Sponsor:** Lenovo Global Technology
- **Hardware Availability:** Apr-2023
- **Software Availability:** Nov-2022
- **CPU2017 License:** 9017
- **Test Date:** Feb-2023
- **Tested by:** Lenovo Global Technology

### SPECspeed 2017_fp_peak = 250

### SPECspeed 2017_fp_base = 235

---

### Platform Notes (Continued)

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**

   ```
   19:11:45 up 3 min,  1 user, load average: 0.16, 0.09, 0.03
   USER    TTY     FROM            LOGIN@    IDLE     JCPU     PCPU WHAT
   root    tty1    -                19:08    33.00s   1.25s    0.13s /bin/bash ./amd_speed_aocc400_genoa_B1.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) 1545969
   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) 1545969
   virtual memory          (kbytes, -v) unlimited
   file locks              (-x) unlimited
   ```

   (Continued on next page)
**Platform Notes (Continued)**

---

5. sysinfo process ancestry

```
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
-bash
/bin/bash ./Run036-compliant-amd-speedfp.sh
python3 ./run_amd_speed_aocc400_genoa_B1.py
/bin/bash ./amd_speed_aocc400_genoa_B1.sh
runcpu --config amd_speed_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 fpspeed
runcpu --configfile amd_speed_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower
--runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/templogs/preenv.fpspeed.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo

$SPEC = /home/cpu2017-1.1.9-amd-aocc400-genoa-Ble
```

---

6. /proc/cpuinfo

```
model name      : AMD EPYC 9354P 32-Core Processor
vendor_id       : AuthenticAMD
cpu family      : 25
model           : 17
stepping        : 1
microcode       : 0xa101111
bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size        : 3584 4K pages
cpu cores       : 32
siblings        : 64
1 physical ids (chips)
64 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 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119
```

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
```

(Continued on next page)
Lenovo Global Technology

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

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

Platform Notes (Continued)

Model name: AMD EPYC 9354P 32-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3799.0720
CPU min MHz: 1500.0000
BogoMIPS: 6490.59

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 cklflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmpref rsl1 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 ssse4 misalignsse 3dnowprefetch osvw ibs skinit wdc tc tce topoext perfctr_core perfctr_nb bpxext perfctr_llc mwaltx cbp cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 ems invpcid cmqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma rclflushopt clwb avx512cd sha_wl avx512bw avx512vl xsaveopt xsaves xgetbv xsavec xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_local cqm_mbb_normal avx512_bf16 c1zero irperf xsaveerptr rdpru wbnoinvd amd_pni arat npt lbrv svm_lock nriz_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pffpthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke avx512_vmbmi gfn vaes vcpu_invcpuid avx512_moa avx512_vpconfq lg57 rdpid overflow_recover succor smca fasm flush_lid

Virtualization: AMD-V
L1d cache: 1 MiB (32 instances)
L1i cache: 1 MiB (32 instances)
L2 cache: 32 MiB (32 instances)
L3 cache: 256 MiB (8 instances)
NUMA node(s): 1
NUMA node0 CPU(s): 0-63
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/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBS_RW, STIBP always-on, RSB filling
Vulnerability Srbd: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE

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| SPECspeed®2017_fp_base = 235 |
| SPECspeed®2017_fp_peak = 250 |

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>L1d</th>
<th>32K</th>
<th>1M</th>
<th>8 Data</th>
<th>1</th>
<th>64</th>
<th>1</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1M</td>
<td>8 Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>1M</td>
<td>32M</td>
<td>8 Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>256M</td>
<td>16 Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

---

8. **numactl --hardware**

NOTE: a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>available:</th>
<th>1 nodes (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus:</td>
<td>0-63</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>386516 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>385397 MB</td>
</tr>
<tr>
<td>node distances:</td>
<td></td>
</tr>
<tr>
<td>node 0</td>
<td>0: 10</td>
</tr>
</tbody>
</table>

---

9. **/proc/meminfo**

MemTotal: 395792820 kB

---

10. **who -r**

run-level 3 Feb 16 19:08

---

11. **Systemd service manager version:** systemd 249 (249.11+suse.124.g2bc0b2c447)

<table>
<thead>
<tr>
<th>Default Target</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>multi-user</td>
<td>running</td>
</tr>
</tbody>
</table>

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12. **Services, from systemctl list-unit-files**

<table>
<thead>
<tr>
<th>STATE</th>
<th>UNIT FILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance iscsi issue-generator kbdsettings llog lvm2-monitor mscd postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-autot4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny</td>
</tr>
<tr>
<td>enabled-runtime</td>
<td>systemd-remount-fs</td>
</tr>
</tbody>
</table>

---

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

---

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result
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Lenovo Global Technology
ThinkSystem SR635 V3
(3.25 GHz, AMD EPYC 9354P)
SPECSpeed®2017_fp_base = 235
SPECSpeed®2017_fp_peak = 250

CPU2017 License: 9017
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Tested by: Lenovo Global Technology
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Hardware Availability: Apr-2023
Software Availability: Nov-2022

Platform Notes (Continued)

BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=07e3aa6d-6e00-4b8c-ab1a-89473b71b5fa
splash=silent
mitigations=auto
quiet
security=apparmor

------------------------------------------------------------
14. cpupower frequency-info
analyzer CPU 0:
current policy: frequency should be within 1.50 GHz and 3.25 GHz.
The governor "performance" may decide which speed to use
within this range.

boost state support:
Supported: yes
Active: yes

------------------------------------------------------------
15. 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
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
     shmemp_enabled  always within_size advise [never] deny force

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Platform Notes (Continued)

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-genoa-Ble
     Filesystem Type Size Used Avail Use% Mounted on
     /dev/sda3 xfs 446G 82G 365G 19% /

20. /sys/devices/virtual/dmi/id
    Vendor: Lenovo
    Product: ThinkSystem SR635V3
    Product Family: ThinkSystem
    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:
      10x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
      2x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800

22. BIOS
    (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor: Lenovo
    BIOS Version: KAE109A-1.40
    BIOS Date: 01/17/2023
    BIOS Revision: 1.40
    Firmware Revision: 1.40
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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#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------------
(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 235
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</tbody>
</table>

Compiler Version Notes (Continued)

LLVM Mirror. Version.14.0.6
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror. Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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.ibm_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
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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
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lmdalloc
-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 -lmdalloc -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 -lmdalloc
-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 -lmdalloc
-lflang
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Base 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

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: -m64 -Wl,-mlibvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mlibvm -Wl,-reduce-array-computations=3 -Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=9 -mlibvm -unroll-threshold=50

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### Lenovo Global Technology

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---

### Peak Optimization Flags (Continued)

638.imagick_s (continued):  
- fremap-arrays -fstrip-mining  
- mlvm -inline-threshold=1000  
- mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt  
- fopenmp=libomp -lomp -lamdlibm -ldamalloc -lflang

644.nab_s: -m64 -Wl,-mlvm -Wl,-region-vectorize -Ofast  
- march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp  
- flto -fstruct-layout=9 -mlvm -unroll-threshold=50  
- fremap-arrays -fstrip-mining  
- mlvm -inline-threshold=1000  
- mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt  
- fopenmp=libomp -lomp -lamdlibm -ldamalloc -lflang

**Fortran benchmarks:**

603.bwaves_s: -m64 -Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6  
- Wl,-mlvm -Wl,-reduce-array-computations=3  
- Wl,-mlvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP  
- Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math  
- -fopenmp -Mrecursive -mlvm -reduce-array-computations=3  
- fvector-transform -fscalar-transform -fopenmp=libomp  
- lomp -lamdlibm -ldamalloc -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

**Benchmarks using both Fortran and C:**

621.wrf_s: -m64 -Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6  
- Wl,-mlvm -Wl,-reduce-array-computations=3  
- Wl,-mlvm -Wl,-enable-X86-prefetching -Ofast  
- march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp  
- flto -fstruct-layout=9 -mlvm -unroll-threshold=50  
- fremap-arrays -fstrip-mining  
- mlvm -inline-threshold=1000  
- mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt  
- O3 -Mrecursive -funroll-loops -mlvm -lslr-in-nested-loop  
- fopenmp=libomp -lomp -lamdlibm -ldamalloc -lflang

627.cam4_s: -m64 -Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6  
- Wl,-mlvm -Wl,-reduce-array-computations=3  
- Wl,-mlvm -Wl,-enable-X86-prefetching -Ofast  
- march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp  
- flto -fstruct-layout=9 -mlvm -unroll-threshold=50

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Peak Optimization Flags (Continued)

627.cam4_s (continued):
-fremap-arrays -fstrip-mining
-mlirv -inline-threshold=1000
-mlirv -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdaloc
-1flang

628.pop2_s -m64 -Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3
-Wl,-mlirv -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mlirv -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlirv -inline-threshold=1000
-mlirv -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdaloc -1flang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3
-Wl,-mlirv -Wl,-x86-use-vzeroupper=false -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=9
-mlirv -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mlirv -inline-threshold=1000 -mlirv -reduce-array-computations=3
-DSPEC_OPENMP -zopt -finline-aggressive -mlirv -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdaloc -1flang

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
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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-R.html
http://www.spec.org/cpu2017/flags/aocc400-flags.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-R.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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