# Lenovo Global Technology

## ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OS:</strong> SUSE Linux Enterprise Server 15 SP4 (x86_64)</td>
<td><strong>CPU Name:</strong> AMD EPYC 9374F</td>
</tr>
<tr>
<td><strong>Compiler:</strong> C/C++/Fortran: Version 4.0.0 of AOCC</td>
<td><strong>Max MHz:</strong> 4300</td>
</tr>
<tr>
<td><strong>Parallel:</strong> Yes</td>
<td><strong>Nominal:</strong> 3850</td>
</tr>
<tr>
<td><strong>Firmware:</strong> Lenovo BIOS Version KAE105F 1.20 released Dec-2022</td>
<td><strong>Enabled:</strong> 64 cores, 2 chips</td>
</tr>
<tr>
<td><strong>File System:</strong> xfs</td>
<td><strong>Orderable:</strong> 1.2 chips</td>
</tr>
<tr>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong> 64-bit</td>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>Peak Pointers:</strong> 64-bit</td>
<td><strong>L3:</strong> 256 MB I+D on chip per chip, 32 MB shared / 4 cores</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td><strong>Other:</strong> None</td>
</tr>
<tr>
<td><strong>Power Management:</strong> BIOS and OS set to prefer performance at the cost of additional power usage</td>
<td></td>
</tr>
</tbody>
</table>

## SPECspeed²017_fp_base = 344

| SPECspeed²017_fp_peak = 349 |

| SPECspeed²017_fp_base = 344 |

| SPECspeed²017_fp_peak = 349 |

<table>
<thead>
<tr>
<th>Test Date: Dec-2022</th>
<th><strong>Test Sponsor:</strong> Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability: Feb-2023</td>
<td><strong>Tested by:</strong> Lenovo Global Technology</td>
</tr>
<tr>
<td>Software Availability: Nov-2022</td>
<td><strong>Tested by:</strong> Lenovo Global Technology</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
</tr>
</tbody>
</table>

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed²017_fp_base</th>
<th>SPECspeed²017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>529</td>
<td>1730</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>212</td>
<td>1730</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>219</td>
<td>212</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>225</td>
<td>198</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>225</td>
<td>212</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
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<td>638.imagick_s</td>
<td>64</td>
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<td>470</td>
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<td>644.nab_s</td>
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<td>669</td>
<td>670</td>
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<td>649.fotonik3d_s</td>
<td>64</td>
<td>208</td>
<td>207</td>
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<tr>
<td>654.roms_s</td>
<td>64</td>
<td>568</td>
<td>568</td>
</tr>
</tbody>
</table>

## Hardware

- **CPU Name:** AMD EPYC 9374F
- **Max MHz:** 4300
- **Nominal:** 3850
- **Enabled:** 64 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 256 MB I+D on chip per chip, 32 MB shared / 4 cores
- **Other:** None
- **Memory:** 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

## Software

- **OS:** SUSE Linux Enterprise Server 15 SP4 (x86_64)
- **Compiler:** C/C++/Fortran: Version 4.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version KAE105F 1.20 released Dec-2022
- **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
Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

SPECspeed®2017_fp_base = 344
SPECspeed®2017_fp_peak = 349

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Base</td>
<td>Peak</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
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<td>1720</td>
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</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>31.5</td>
<td>31.6</td>
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<td>619.lbm_s</td>
<td>64</td>
<td>24.7</td>
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<td>24.7</td>
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<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>164</td>
<td>72.3</td>
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<td>72.0</td>
<td>164</td>
<td>72.4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>30.6</td>
<td>30.7</td>
<td>471</td>
<td>31.4</td>
<td>459</td>
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<tr>
<td>644.nab_s</td>
<td>64</td>
<td>26.1</td>
<td>26.1</td>
<td>669</td>
<td>26.0</td>
<td>671</td>
<td>26.1</td>
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<td>649.fotonik3d_s</td>
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<td>44.0</td>
<td>44.1</td>
<td>207</td>
<td>44.3</td>
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<tr>
<td>654.roms_s</td>
<td>64</td>
<td>27.7</td>
<td>27.7</td>
<td>568</td>
<td>28.5</td>
<td>552</td>
<td>27.7</td>
</tr>
</tbody>
</table>

 SPECspeed®2017_fp_base = 344
 SPECspeed®2017_fp_peak = 349

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,
## Lenovo Global Technology

ThinkSystem SR665 V3  
(3.85 GHz, AMD EPYC 9374F)

### SPEC CPU 2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 344</th>
<th>SPECspeed®2017_fp_peak = 349</th>
</tr>
</thead>
</table>

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

### Operating System Notes (Continued)

- `echo always > /sys/kernel/mm/transparent_hugepage/enabled` and  
  `echo always > /sys/kernel/mm/transparent_hugepage/defrag` run as root.

To always enable THP for peak runs of:
- 603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:

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

To disable THP for peak runs of 621.wrf_s:

  - `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/cpu2017-1.1.8-amd-aocc400-genoa-B1b/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 = "0-63"`

Environment variables set by `runcpu` during the 619.lbm_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by `runcpu` during the 621.wrf_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

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 = "0-63"`

Environment variables set by `runcpu` during the 638.imagick_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"`

Environment variables set by `runcpu` during the 644.nab_s peak run:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

Environment Variables Notes (Continued)

GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-63"
PGHPF_ZMEM = "yes"

General Notes

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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Operating Mode set to Maximum Performance
SMT Mode set to Disabled

Sysinfo program /home/cpu2017-1.1.8-amd-aocc400-genoa-B1b/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca664d
running on localhost Sat Dec 10 05:30:50 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo

```
model name : AMD EPYC 9374F 32-Core Processor
  2 "physical id"s (chips)
  64 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
  cpu cores : 32
  siblings : 32
  physical 0: cores 0 1 2 3 16 17 18 19 32 33 34 35 48 49 50 51 64 65 66 67 80 81 82
             83 96 97 98 99 112 113 114 115
  physical 1: cores 0 1 2 3 16 17 18 19 32 33 34 35 48 49 50 51 64 65 66 67 80 81 82
             83 96 97 98 99 112 113 114 115
```

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

SPECspeed®2017_fp_peak = 349
SPECspeed®2017_fp_base = 344

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

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

Platform Notes (Continued)

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 9374F 32-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4304.9312
CPU min MHz: 1500.0000
BogoMIPS: 7688.57
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 rafi pni pclmulqdq monitor ssse3 fma cx16 pdcm sse4_1 sse4_2 x2apic movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misaligncache dnowprefetch osw ibs skinit wdt tce topoext perfctr_core perfctr_nb perfctr_l1d mwaitx cbp cat_l3 cpb cat_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bm11 avx2 smep bmi2 erms invpcid cmov rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw
avx512vl vsaveopt vsavec xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbms_total
cqm_mbm_local avx512_bf16 cizer0 irperf xsaveopt rdrand rdrnd pnoninvvd amd_pmp arat
npt lbrv svm_lock rip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
Threshold avic vmsave_vmla geng v_spec_ctrl avx512vbmi umip pkp ospe
avx512vbmi gfn vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57
rdpid overflow_recov succor smca fsm flush_l1d
Virtualization: AMD-V
L1d cache: 2 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 64 MiB (64 instances)
L3 cache: 512 MiB (16 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
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
Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

SPECSpeed®2017_fp_base = 344
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2022
Hardware Availability: Feb-2023
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Software Availability: Nov-2022

Platform Notes (Continued)

prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitation
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 2M 8 Data 1 64 1 64
L1i 32K 2M 8 Instruction 1 64 1 64
L2 1M 64M 8 Unified 2 2048 1 64
L3 32M 512M 16 Unified 3 32768 1 64

/proc/cpuinfo cache data
  cache size : 1024 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
    node 0 size: 773673 MB
    node 0 free: 772349 MB
    node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
    node 1 size: 773882 MB
    node 1 free: 772962 MB
    node distances:
      node   0   1
      0: 10 32
      1: 32 10

From /proc/meminfo
  MemTotal: 1584696512 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP4"
    VERSION_ID="15.4"
# SPEC CPU®2017 Floating Point Speed Result

**Lenovo Global Technology**  
ThinkSystem SR665 V3  
(3.85 GHz, AMD EPYC 9374F)

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<th>SPECspeed®2017_fp_base</th>
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<tbody>
<tr>
<td>344</td>
<td>349</td>
</tr>
</tbody>
</table>

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

---

**Platform Notes (Continued)**

```
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp4"
```

```
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
```

**Kernel self-reported vulnerability status:**

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVE-2018-12207 (iTLB Multihit)</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2018-3620 (L1 Terminal Fault)</td>
<td>Not affected</td>
</tr>
<tr>
<td>Microarchitectural Data Sampling</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2017-5754 (Meltdown)</td>
<td>Mitigation: Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>CVE-2018-3639 (Speculative Store Bypass)</td>
<td>Mitigation: usercopy/swapgs barriers and __user pointer sanitization</td>
</tr>
<tr>
<td>CVE-2017-5753 (Spectre variant 1)</td>
<td>Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling</td>
</tr>
<tr>
<td>CVE-2017-5715 (Spectre variant 2)</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2020-0543 (Special Register Buffer Data Sampling)</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2019-11135 (TSX Asynchronous Abort)</td>
<td>Not affected</td>
</tr>
</tbody>
</table>

---

run-level 3 Dec 10 00:04

**SPEC is set to:** /home/cpu2017-1.1.8-amd-aocc400-genoa-B1b

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>xfs</td>
<td>446G</td>
<td>31G</td>
<td>416G</td>
<td>7%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

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

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:**

- 24x SK Hynix HMCG94AEBRA102N 64 GB 2 rank 4800

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

SPECspeed®2017_fp_base = 344
SPECspeed®2017_fp_peak = 349

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2022

Tested by: Lenovo Global Technology
Hardware Availability: Feb-2023
Software Availability: Nov-2022

Platform Notes (Continued)

BIOS:
- BIOS Vendor: Lenovo
- BIOS Version: KAE105F-1.20
- BIOS Date: 12/01/2022
- BIOS Revision: 1.20
- Firmware Revision: 1.20

(End of data from sysinfo program)

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)
==============================================================================

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665 V3 (3.85 GHz, AMD EPYC 9374F)

**SPECspeed®2017_fp_base = 344**
**SPECspeed®2017_fp_peak = 349**

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

**Compiler Version Notes (Continued)**

```
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
```

**Base Compiler Invocation**

**C benchmarks:**

```
clang
```

**Fortran benchmarks:**

```
flang
```

**Benchmarks using both Fortran and C:**

```
flang clang
```

**Benchmarks using Fortran, C, and C++:**

```
clang++ clang flang
```

**Base Portability Flags**

```
603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
```

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

SPECspeed®2017_fp_base = 344
SPECspeed®2017_fp_peak = 349

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

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

Base Portability Flags (Continued)
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags
C benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

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

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

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

| SPECspeed®2017_fp_base = 344 |
| SPECspeed®2017_fp_peak = 349 |

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

### Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- `-fremap-arrays`  
- `-fstrip-mining`  
- `-mllvm -reduce-array-computations=3`  
- `-DSPEC_OPENMP`  
- `-zopt`  
- `-mllvm -reduce-array-computations=3`  
- `-mllvm -loop-unswitch-threshold=200000`  
- `-Mrecursive`  
- `-funroll-loops`  
- `-mllvm -lsr-in-nested-loop`  
- `-fopenmp=libomp`  
- `-lomp`  
- `-lamdlibm`  
- `-lamdalloc`  
- `-lflang`

### Base Other Flags

C benchmarks:
- `-Wno-return-type`  
- `-Wno-unused-command-line-argument`

Fortran benchmarks:
- `-Wno-unused-command-line-argument`

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:**
  - `--m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
  - `--m64 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
  - `--march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp`
  - `--flto -fstruct-layout=9 -mllvm -unroll-threshold=50`
  - `--fremp-arrays -fstrip-mining`
  - `--mllvm -inline-threshold=1000`
  - `--mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
  - `--fopenmp=libomp -lomp -lamdlibm -lamdallocate -lflang`

- **638.imagick_s:** Same as 619.\(\text{lbm}\_s\)

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

### Fortran benchmarks:

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

- **649.fotonik3d_s:**
  - `--m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
  - `--m64 -Wl,-mllvm -Wl,-reduce-array-computations=3`
  - `--m64 -Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP`
  - `--Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math`
  - `--fopenmp -flto -Mrecursive`
  - `--mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp`
  - `--lomp -lamdlibm -lamdallocate -lflang`

- **654.roms_s:** `basepeak = yes`

### Benchmarks using both Fortran and C:

- **621.wrf_s:**
  - `--m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
  - `--m64 -Wl,-mllvm -Wl,-reduce-array-computations=3`
  - `--m64 -Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast`

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SR665 V3**  
(3.85 GHz, AMD EPYC 9374F)

**SPECspeed®2017_fp_peak = 349**  
**SPECspeed®2017_fp_base = 344**

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<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
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<td>Test Date</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
</tr>
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</table>

**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Feb-2023  
**Software Availability:** Nov-2022  
**Test Date:** Dec-2022

---

#### Peak Optimization Flags (Continued)

621.wrf_s (continued):
- -march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
- -fto -fstruct-layout=9 -mllvm -unroll-threshold=50
- -fremap-arrays -fstrip-mining
- -mllvm -inline-threshold=1000
- -mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
- -O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
- -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s:
- -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mllvm -Wl,-reduce-array-computations=3
- -Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
- -march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
- -fto -fstruct-layout=9 -mllvm -unroll-threshold=50
- -fremap-arrays -fstrip-mining
- -mllvm -inline-threshold=1000
- -mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
- -Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

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

#### Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

---

#### Peak Other Flags

**C benchmarks:**
- -Wno-return-type -Wno-unused-command-line-argument

**Fortran benchmarks:**
- -Wno-unused-command-line-argument

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665 V3
(3.85 GHz, AMD EPYC 9374F)

Peak Other Flags (Continued)

Benchmarks using both Fortran and C:
-Wno-return-type -Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:
-Wno-return-type -Wno-unused-command-line-argument

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

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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