



# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology ThinkSystem SR655 V3 2.40 GHz, AMD EPYC 9654

SPECspeed®2017_fp_base =	245
SPECspeed®2017_fp_energy_base =	946
SPECspeed®2017_fp_peak =	250
SPECspeed®2017_fp_energy_peak =	961

CPU2017 License: 9017

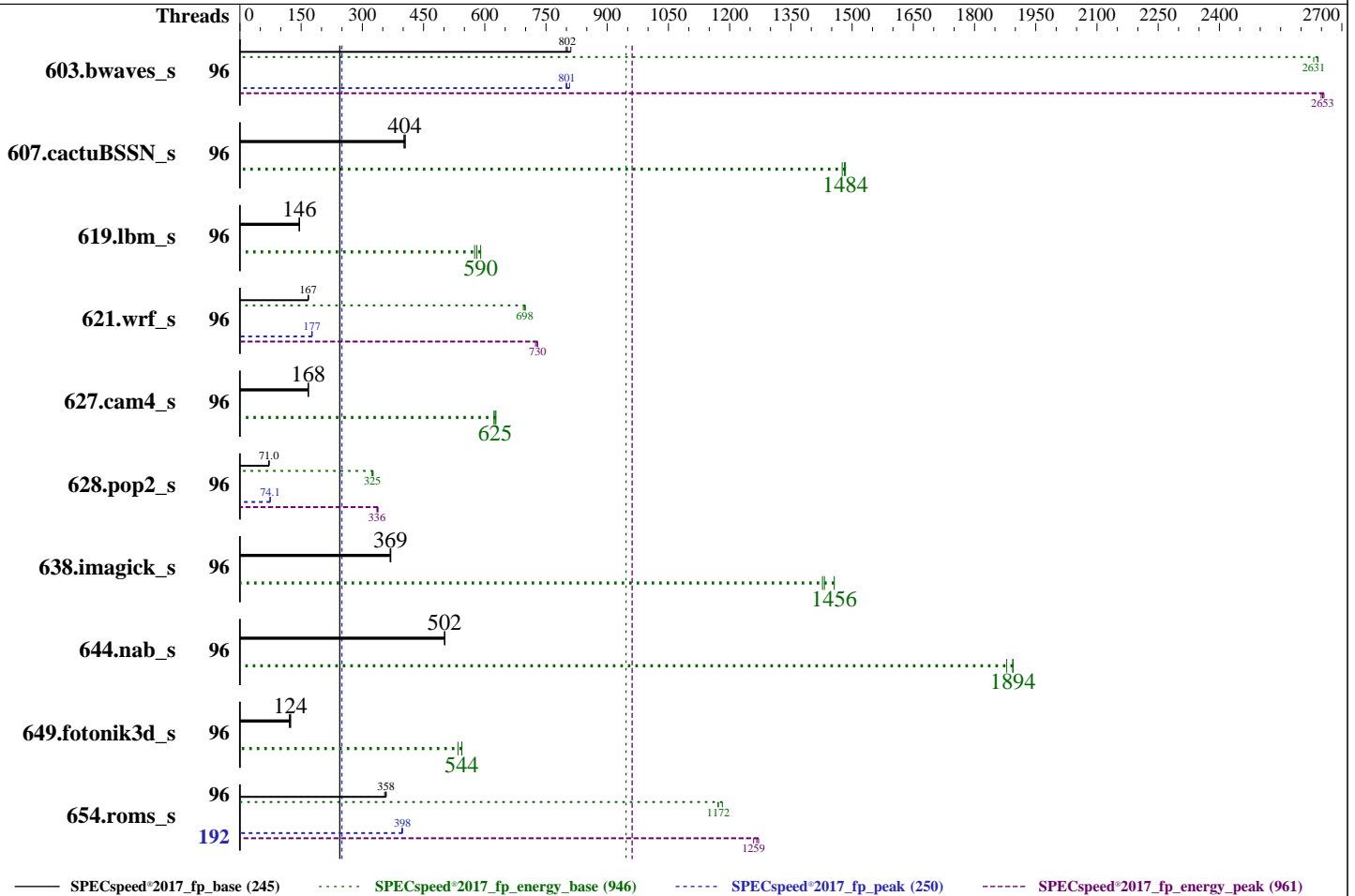
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2023

Hardware Availability: Apr-2023

Software Availability: Nov-2022



### Hardware

CPU Name: AMD EPYC 9654  
 Max MHz: 3700  
 Nominal: 2400  
 Enabled: 96 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: 384 MB I+D on chip per chip,  
 32 MB shared / 8 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: Red Hat Enterprise Linux 9.0 (Plow)  
 Kernel 5.14.0-70.22.1.el9\_0.x86\_64  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: Yes  
 Firmware: Lenovo BIOS Version KAE105L 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 balance power and performance



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### Power

Max. Power (W): 391.2  
Idle Power (W): 88.67  
Min. Temperature (C): 22.56  
Elevation (m): 43  
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
Provisioning: Line-powered

### Power Settings

Management FW: Version 1.30 of KAX311A  
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 1800 W (non-redundant)  
Details: 4P57A78359  
Backplane: 8 x 2.5-inch HDD back plane  
Other Storage: None  
Storage Model #: 4XB7A17107  
NICs Installed: 1 x ThinkSystem Ethernet 4-port Adaptor @ 1 Gb  
NICs Enabled (FW/OS): 4 / 1  
NICs Connected/Speed: 1 @ 1 Gb  
Other HW Model #: 6 x Performance fans

### Power Analyzer

Power Analyzer: WIN:9888  
Hardware Vendor: YOKOGAWA, Inc.  
Model: YokogawaWT310E  
Serial Number: C3UG05013E  
Input Connection: Default  
Metrology Institute: CNAS  
Calibration By: GRG METROLOGY & TEST (BEIJING) CO., LTD.  
Calibration Label: J202210116758A-0007  
Calibration Date: 19-Oct-2022  
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: Connected to PSU1  
Current Ranges Used: 5A  
Voltage Range Used: 300V

### Temperature Meter

Temperature Meter: WIN:9889  
Hardware Vendor: Digi International, Inc.  
Model: DigiWATCHPORT\_H  
Serial Number: W63390099  
Input Connection: USB  
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: 50 mm in front of SUT main intake

## Base Results Table

Benchmark	Threads	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
603.bwaves_s	96	73.8	800	24.4	2640	330	340	72.8	811	24.4	2640	335	343	<b>73.5</b>	<b>802</b>	<b>24.5</b>	<b>2630</b>	<b>333</b>	<b>342</b>
607.cactuBSSN_s	96	41.2	405	12.4	1480	300	323	41.5	402	12.3	1480	297	328	<b>41.2</b>	<b>404</b>	<b>12.3</b>	<b>1480</b>	<b>298</b>	<b>324</b>
619.lbm_s	96	35.9	146	10.2	581	286	318	<b>35.9</b>	<b>146</b>	<b>10.1</b>	<b>590</b>	<b>281</b>	<b>311</b>	36.1	145	10.3	575	286	320
621.wrf_s	96	79.1	167	20.8	695	263	267	78.8	168	20.7	699	262	267	<b>79.0</b>	<b>167</b>	<b>20.7</b>	<b>698</b>	<b>262</b>	<b>267</b>
627.cam4_s	96	52.8	168	15.5	622	293	323	<b>52.9</b>	<b>168</b>	<b>15.4</b>	<b>625</b>	<b>292</b>	<b>321</b>	53.1	167	15.4	627	290	323
628.pop2_s	96	<b>167</b>	<b>71.0</b>	<b>40.2</b>	<b>325</b>	<b>240</b>	<b>244</b>	167	71.0	40.3	324	241	244	166	71.6	40.0	326	241	245
638.imagick_s	96	39.2	368	11.0	1430	281	337	<b>39.1</b>	<b>369</b>	<b>10.8</b>	<b>1460</b>	<b>276</b>	<b>336</b>	39.0	370	11.0	1430	281	337
644.nab_s	96	34.8	502	10.0	1890	288	316	34.8	502	10.1	1880	291	315	<b>34.8</b>	<b>502</b>	<b>10.0</b>	<b>1890</b>	<b>288</b>	<b>315</b>
649.fotonik3d_s	96	75.2	121	19.2	534	255	298	<b>73.7</b>	<b>124</b>	<b>18.8</b>	<b>544</b>	<b>255</b>	<b>299</b>	73.4	124	18.8	544	256	299
654.roms_s	96	<b>44.0</b>	<b>358</b>	<b>15.0</b>	<b>1170</b>	<b>342</b>	<b>360</b>	44.4	355	15.0	1170	338	360	43.9	358	14.9	1180	339	363

SPECspeed®2017\_fp\_base = 245

SPECspeed®2017\_fp\_energy\_base = 946

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



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## Peak Results Table

Benchmark	Threads	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
603.bwaves_s	96	<b>73.6</b>	<b>801</b>	<b>24.3</b>	<b>2650</b>	<b>329</b>	<b>348</b>	73.0	808	24.2	2660	332	347	73.8	799	24.3	2650	329	338
607.cactuBSSN_s	96	41.2	405	12.4	1480	300	323	41.5	402	12.3	1480	297	328	<b>41.2</b>	<b>404</b>	<b>12.3</b>	<b>1480</b>	<b>298</b>	<b>324</b>
619.lbm_s	96	35.9	146	10.2	581	286	318	<b>35.9</b>	<b>146</b>	<b>10.1</b>	<b>590</b>	<b>281</b>	<b>311</b>	36.1	145	10.3	575	286	320
621.wrf_s	96	75.1	176	19.9	724	265	269	<b>74.8</b>	<b>177</b>	<b>19.8</b>	<b>730</b>	<b>264</b>	<b>269</b>	74.8	177	19.8	728	265	270
627.cam4_s	96	52.8	168	15.5	622	293	323	<b>52.9</b>	<b>168</b>	<b>15.4</b>	<b>625</b>	<b>292</b>	<b>321</b>	53.1	167	15.4	627	290	323
628.pop2_s	96	160	74.3	38.6	338	241	245	160	74.0	38.8	337	241	245	<b>160</b>	<b>74.1</b>	<b>38.9</b>	<b>336</b>	<b>242</b>	<b>246</b>
638.imagick_s	96	39.2	368	11.0	1430	281	337	<b>39.1</b>	<b>369</b>	<b>10.8</b>	<b>1460</b>	<b>276</b>	<b>336</b>	39.0	370	11.0	1430	281	337
644.nab_s	96	34.8	502	10.0	1890	288	316	34.8	502	10.1	1880	291	315	<b>34.8</b>	<b>502</b>	<b>10.0</b>	<b>1890</b>	<b>288</b>	<b>315</b>
649.fotonik3d_s	96	75.2	121	19.2	534	255	298	<b>73.7</b>	<b>124</b>	<b>18.8</b>	<b>544</b>	<b>255</b>	<b>299</b>	73.4	124	18.8	544	256	299
654.roms_s	192	39.5	398	13.9	1270	352	380	39.7	397	13.9	1270	349	374	<b>39.5</b>	<b>398</b>	<b>14.0</b>	<b>1260</b>	<b>354</b>	<b>380</b>

SPECspeed®2017\_fp\_peak = 250

SPECspeed®2017\_fp\_energy\_peak = 961

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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

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## Operating System Notes (Continued)

```
'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 = "0-191"
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 = "192"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 96 1 97 2 98 3 99 4 100 5 101 6 102 7 103 8 104 9 105
10 106 11 107 12 108 13 109 14 110 15 111 16 112 17 113 18 114 19 115 20
116 21 117 22 118 23 119 24 120 25 121 26 122 27 123 28 124 29 125 30
126 31 127 32 128 33 129 34 130 35 131 36 132 37 133 38 134 39 135 40
136 41 137 42 138 43 139 44 140 45 141 46 142 47 143 48 144 49 145 50
146 51 147 52 148 53 149 54 150 55 151 56 152 57 153 58 154 59 155 60
156 61 157 62 158 63 159 64 160 65 161 66 162 67 163 68 164 69 165 70
166 71 167 72 168 73 169 74 170 75 171 76 172 77 173 78 174 79 175 80
```

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## Environment Variables Notes (Continued)

176 81 177 82 178 83 179 84 180 85 181 86 182 87 183 88 184 89 185 90  
186 91 187 92 188 93 189 94 190 95 191"

## 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 Custom Mode  
Determinism Slider set to Power  
Core Performance Boost set to Disabled  
DF P-states set to P1

Sysinfo program /home/cpu2017-1.1.8-amd-aocc400-genoa-Blb/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on localhost.localdomain Sun Jan 29 03:29:14 2023

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 9654 96-Core Processor  
1 "physical id"s (chips)  
192 "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 : 96  
siblings : 192  
physical 0: cores 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25  
26 27 28 29 30 31 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81

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### Platform Notes (Continued)

82 83 84 85 86 87 88 89 90 91 92 93 94 95

From lscpu from util-linux 2.37.4:

```

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):                192
On-line CPU(s) list:   0-191
Vendor ID:             AuthenticAMD
BIOS Vendor ID:        Advanced Micro Devices, Inc.
Model name:            AMD EPYC 9654 96-Core Processor
BIOS Model name:       AMD EPYC 9654 96-Core Processor
CPU family:            25
Model:                 17
Thread(s) per core:    2
Core(s) per socket:    96
Socket(s):             1
Stepping:              1
Frequency boost:       disabled
CPU max MHz:           3707.8120
CPU min MHz:           1500.0000
BogoMIPS:              4792.57
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
aperfmpperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb
bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmcall 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_lld
Virtualization:        AMD-V
L1d cache:             3 MiB (96 instances)
L1i cache:             3 MiB (96 instances)
L2 cache:              96 MiB (96 instances)
L3 cache:              384 MiB (12 instances)
NUMA node(s):         1
NUMA node0 CPU(s):    0-191

```

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## Platform Notes (Continued)

Vulnerability Itlb multihit: Not affected  
Vulnerability Lltf: Not affected  
Vulnerability Mds: Not affected  
Vulnerability Meltdown: Not affected  
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl  
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and \_\_user pointer sanitization  
Vulnerability Spectre v2: Mitigation; 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
L1d	32K	3M	8	Data	1	64	1	64
L1i	32K	3M	8	Instruction	1	64	1	64
L2	1M	96M	8	Unified	2	2048	1	64
L3	32M	384M	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: 1 nodes (0)  
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 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85  
86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110  
111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132  
133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154  
155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176  
177 178 179 180 181 182 183 184 185 186 187 188 189 190 191  
node 0 size: 386485 MB  
node 0 free: 383417 MB  
node distances:  
node 0  
0: 10

From /proc/meminfo

MemTotal: 395761164 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

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## Platform Notes (Continued)

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

```
From /etc/*release* /etc/*version*  
os-release:
```

```
NAME="Red Hat Enterprise Linux"  
VERSION="9.0 (Plow)"  
ID="rhel"  
ID_LIKE="fedora"  
VERSION_ID="9.0"  
PLATFORM_ID="platform:el9"  
PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"  
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)  
system-release: Red Hat Enterprise Linux release 9.0 (Plow)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos
```

```
uname -a:
```

```
Linux localhost.localdomain 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64 x86_64 x86_64 GNU/Linux
```

```
Kernel self-reported vulnerability status:
```

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

```
run-level 3 Jan 28 16:32
```

```
SPEC is set to: /home/cpu2017-1.1.8-amd-aocc400-genoa-B1b  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda4 xfs 372G 19G 354G 5% /home
```

```
From /sys/devices/virtual/dmi/id
```

(Continued on next page)





# SPEC CPU®2017 Floating Point Speed Result

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**Lenovo Global Technology**  
**ThinkSystem SR655 V3**  
**2.40 GHz, AMD EPYC 9654**

SPECspeed®2017\_fp\_base = 245  
SPECspeed®2017\_fp\_energy\_base = 946  
SPECspeed®2017\_fp\_peak = 250  
SPECspeed®2017\_fp\_energy\_peak = 961

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

**Test Date:** Jan-2023  
**Hardware Availability:** Apr-2023  
**Software Availability:** Nov-2022

## Platform Notes (Continued)

Vendor: Lenovo  
Product: ThinkSystem SR655V3  
Product Family: ThinkSystem  
Serial: 1234567890

Additional information from dmidecode 3.3 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:  
6x SK Hynix HMC88AEBRA115N 32 GB 2 rank 4800  
6x SK Hynix HMC88AEBRA168N 32 GB 2 rank 4800

BIOS:  
BIOS Vendor: Lenovo  
BIOS Version: KAE105L-1.20  
BIOS Date: 12/29/2022  
BIOS Revision: 1.20  
Firmware Revision: 1.30

(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

(Continued on next page)



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## 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

-----  
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  
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

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**Software Availability:** Nov-2022

## Base Compiler Invocation (Continued)

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  
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 -lsr-in-nested-loop

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**Test Date:** Jan-2023

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**Software Availability:** Nov-2022

## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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 -lsr-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  
-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 -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
```



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**Tested by:** Lenovo Global Technology

**Test Date:** Jan-2023  
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**Software Availability:** Nov-2022

## 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: basepeak = yes

644.nab\_s: basepeak = yes

Fortran benchmarks:

603.bwaves\_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-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 -lamdalloc -lflang

649.fotonik3d\_s: basepeak = yes

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## Peak Optimization Flags (Continued)

654.roms\_s: Same as 603.bwaves\_s

Benchmarks using both Fortran and C:

```
621.wrf_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
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-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: basepeak = yes

```
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
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-freemap-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
```

Benchmarks using both Fortran and C:

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

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## Peak Other Flags (Continued)

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-Q.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-Q.xml>  
<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

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