# SPEC CPU®2017 Floating Point Rate Result

## Lenovo Global Technology
### ThinkSystem SR645
### 2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

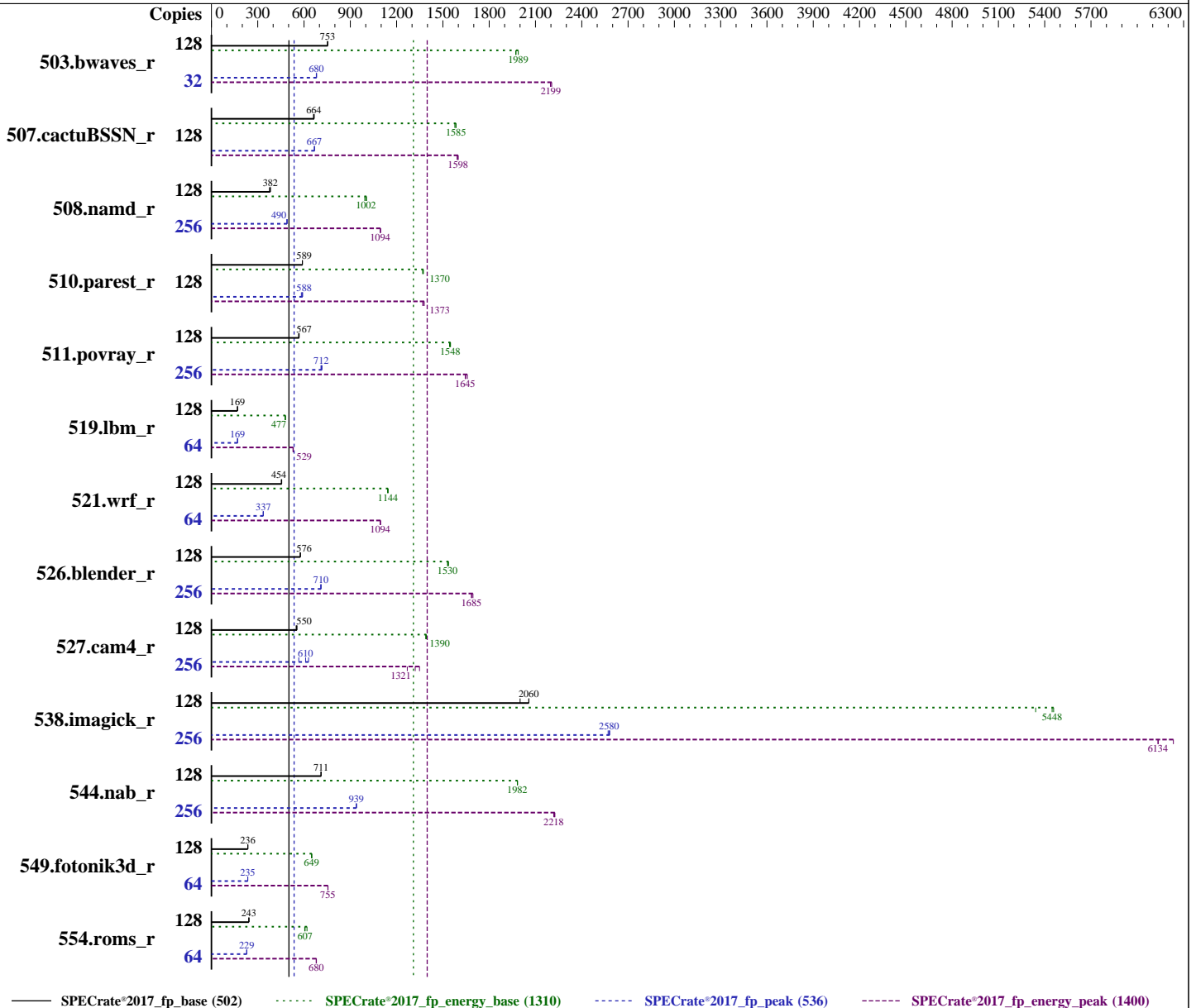**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021



| Benchmark | Copies | base | energy_base | peak | energy_peak |
|---|---|---|---|---|---|
| 503.bwaves_r | 128 | 753 | 1989 | | |
| | 32 | 680 | | | 2199 |
| 507.cactuBSSN_r | 128 | 664 | 1585 | 667 | 1598 |
| 508.namd_r | 128 | 382 | 1002 | | |
| | 256 | 490 | | | 1094 |
| 510.parest_r | 128 | 589 | 1370 | 588 | 1373 |
| 511.povray_r | 128 | 567 | 1548 | | |
| | 256 | 712 | | | 1645 |
| 519.lbm_r | 128 | 169 | 477 | | |
| | 64 | 169 | | | 529 |
| 521.wrf_r | 128 | 454 | 1144 | | |
| | 64 | 337 | | | 1094 |
| 526.blender_r | 128 | 576 | 1530 | | |
| | 256 | 710 | | | 1685 |
| 527.cam4_r | 128 | 550 | 1390 | | |
| | 256 | 610 | | | 1321 |
| 538.imagick_r | 128 | 2060 | 5448 | | |
| | 256 | 2580 | | | 6134 |
| 544.nab_r | 128 | 711 | 1982 | | |
| | 256 | 939 | | | 2218 |
| 549.fotonik3d_r | 128 | 236 | 649 | | |
| | 64 | 235 | | | 755 |
| 554.roms_r | 128 | 243 | 607 | | |
| | 64 | 229 | | | 680 |

— SPECrate®2017_fp_base (502)   ⋯ SPECrate®2017_fp_energy_base (1310)   -- - SPECrate®2017_fp_peak (536)   -- - SPECrate®2017_fp_energy_peak (1400)

## Hardware

CPU Name: AMD EPYC 7713
 Max MHz: 3675
 Nominal: 2000
 Enabled: 128 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips

*(Continued on next page)*

## Software

OS: SUSE Linux Enterprise Server 15 SP2 (x86_64)
Kernel 5.3.18-22-default
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: Lenovo BIOS Version D8E115B 2.00 released Feb-2021

*(Continued on next page)*

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## Hardware (Continued)

Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 256 MB I+D on chip per chip,  
 32 MB shared / 8 cores  
 Other: None  
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)  
Storage: 1 x 960 GB SATA SSD  
Other: None  

## Software (Continued)

File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: jemalloc: jemalloc memory allocator library v5.1.0  
Power Management: BIOS set to balance power and performance  

## Power

Max. Power (W): 550.93  
Idle Power (W): 190.4  
Min. Temperature (C): 23.06  
Elevation (m): 43  
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
Provisioning: Line-powered  

## Power Settings

Management FW: Version 3.00 of D8BT15H  
Memory Mode: Normal  

## Power-Relevant Hardware

Power Supply: 1 x 750 W (non-redundant)  
 Details: ThinkSystem 750W Titanium Power Supply 4P57A26292  
Backplane: 10 x 2.5-inch HDD back plane  
Other Storage: None  
Storage Model #s: 4XB7A17089  
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 #s: 8 x High Performance fans  

## Power Analyzer

Power Analyzer: WIN:9888  
Hardware Vendor: YOKOGAWA, Inc.  
Model: YokogawaWT310E  
Serial Number: C3UD17023E  
Input Connection: Default  
Metrology Institute: CNAS  
Calibration By: GUANG ZHOU GRG METROLOGY & TEST CO.,LTD.  
Calibration Label: J202009040176A-0001  
Calibration Date: 25-Sep-2020  
PTDaemon™ Version: 1.9.1 (a2d19f26; 2019-07-17)  
Setup Description: Connected to PSU1  
Current Ranges Used: 2.5A  
Voltage Range Used: 300V  

## Temperature Meter

Temperature Meter: WIN:9889  
Hardware Vendor: Digi International, Inc.  
Model: DigiWATCHPORT_H  
Serial Number: W62330940  
Input Connection: USB  
PTDaemon Version: 1.9.1 (a2d19f26; 2019-07-17)  
Setup Description: 50 mm in front of SUT main intake  

## Base Results Table

| Benchmark | Copies | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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## Base Results Table (Continued)

| Benchmark | Copies | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 503.bwaves_r | 128 | 1703 | 754 | 710 | 1970 | 417 | 427 | **1705** | **753** | **704** | **1990** | **413** | **425** | 1706 | 752 | 709 | 1970 | 415 | 426 |
| 507.cactuBSSN_r | 128 | 243 | 666 | 113 | 1580 | 464 | 470 | **244** | **664** | **112** | **1580** | **460** | **468** | 245 | 661 | 112 | 1580 | 459 | 466 |
| 508.namd_r | 128 | **319** | **382** | **132** | **1000** | **415** | **422** | 318 | 382 | 132 | 1000 | 414 | 420 | 323 | 376 | 133 | 994 | 413 | 420 |
| 510.parest_r | 128 | **568** | **589** | **266** | **1370** | **468** | **534** | 569 | 589 | 266 | 1370 | 468 | 532 | 568 | 590 | 265 | 1370 | 467 | 533 |
| 511.povray_r | 128 | 529 | 565 | 210 | 1540 | 397 | 407 | 526 | 569 | 209 | 1550 | 398 | 407 | **527** | **567** | **210** | **1550** | **397** | **406** |
| 519.lbm_r | 128 | **799** | **169** | **321** | **477** | **402** | **403** | 799 | 169 | 320 | 479 | 401 | 404 | 800 | 169 | 319 | 480 | 399 | 402 |
| 521.wrf_r | 128 | 629 | 456 | 274 | 1140 | 435 | 448 | 633 | 453 | 274 | 1140 | 433 | 448 | **631** | **454** | **274** | **1140** | **434** | **447** |
| 526.blender_r | 128 | **338** | **576** | **138** | **1530** | **408** | **426** | 338 | 576 | 138 | 1530 | 407 | 424 | 338 | 576 | 137 | 1540 | 406 | 425 |
| 527.cam4_r | 128 | 404 | 555 | 175 | 1390 | 434 | 463 | 407 | 550 | 175 | 1390 | 431 | 467 | **407** | **550** | **175** | **1390** | **431** | **483** |
| 538.imagick_r | 128 | 159 | 2000 | 64.5 | 5340 | 406 | 451 | 155 | 2060 | 63.2 | 5460 | 408 | 447 | **155** | **2060** | **63.3** | **5450** | **409** | **448** |
| 544.nab_r | 128 | **303** | **711** | **118** | **1980** | **389** | **414** | 303 | 710 | 118 | 1980 | 388 | 414 | 303 | 711 | 118 | 1980 | 388 | 416 |
| 549.fotonik3d_r | 128 | 2114 | 236 | 856 | 649 | 405 | 407 | 2116 | 236 | 854 | 650 | 404 | 407 | **2116** | **236** | **856** | **649** | **405** | **408** |
| 554.roms_r | 128 | 838 | 243 | 371 | 604 | 443 | 459 | **838** | **243** | **370** | **607** | **441** | **456** | 837 | 243 | 362 | 619 | 433 | 453 |

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |

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

## Peak Results Table

| Benchmark | Copies | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 503.bwaves_r | 32 | **472** | **680** | **159** | **2200** | **337** | **348** | 471 | 682 | 159 | 2210 | 337 | 347 | 472 | 680 | 159 | 2200 | 337 | 345 |
| 507.cactuBSSN_r | 128 | 242 | 668 | 111 | 1600 | 459 | 466 | **243** | **667** | **111** | **1600** | **459** | **467** | 243 | 667 | 112 | 1590 | 461 | 468 |
| 508.namd_r | 256 | 497 | 490 | 242 | 1100 | 487 | 504 | 497 | 490 | 242 | 1100 | 488 | 505 | **497** | **490** | **242** | **1090** | **488** | **508** |
| 510.parest_r | 128 | **569** | **588** | **265** | **1370** | **466** | **532** | 567 | 591 | 264 | 1380 | 466 | 531 | 575 | 583 | 266 | 1370 | 463 | 532 |
| 511.povray_r | 256 | **840** | **712** | **394** | **1640** | **470** | **477** | 842 | 710 | 394 | 1650 | 468 | 477 | 834 | 717 | 391 | 1660 | 469 | 475 |
| 519.lbm_r | 64 | 398 | 169 | 144 | 531 | 363 | 367 | **398** | **169** | **145** | **529** | **364** | **409** | 399 | 169 | 145 | 529 | 363 | 368 |
| 521.wrf_r | 64 | **426** | **337** | **143** | **1090** | **336** | **342** | 428 | 335 | 143 | 1090 | 335 | 340 | 426 | 337 | 143 | 1100 | 335 | 341 |
| 526.blender_r | 256 | **549** | **710** | **251** | **1690** | **456** | **486** | 549 | 710 | 250 | 1690 | 456 | 488 | 550 | 709 | 249 | 1690 | 453 | 486 |
| 527.cam4_r | 256 | **734** | **610** | **369** | **1320** | **503** | **526** | 711 | 630 | 362 | 1350 | 508 | 529 | 791 | 566 | 384 | 1270 | 486 | 551 |
| 538.imagick_r | 256 | 248 | 2570 | 112 | 6140 | 454 | 535 | **247** | **2580** | **112** | **6130** | **455** | **535** | 247 | 2580 | 111 | 6230 | 448 | 523 |
| 544.nab_r | 256 | **459** | **939** | **211** | **2220** | **459** | **467** | 459 | 939 | 210 | 2230 | 457 | 468 | 459 | 939 | 210 | 2220 | 458 | 466 |
| 549.fotonik3d_r | 64 | **1060** | **235** | **368** | **755** | **347** | **350** | 1060 | 235 | 368 | 755 | 347 | 350 | 1059 | 236 | 368 | 756 | 347 | 350 |
| 554.roms_r | 64 | 443 | 229 | 165 | 680 | 372 | 382 | 445 | 229 | 165 | 679 | 371 | 381 | **444** | **229** | **165** | **680** | **371** | **379** |

| | |
|---|---|
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

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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.

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## 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>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
randomization (ASLR) to reduce run-to-run variability.

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root for peak
integer runs and all FP runs to enable Transparent Hugepages (THP).
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for base
integer runs to enable THP only on request.
```

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.5-amd-aocc300-milan-A1/amd_rate_aocc300_milan_A_lib/6
     4;/home/cpu2017-1.1.5-amd-aocc300-milan-A1/amd_rate_aocc300_milan_A_lib/
     32:"
MALLOC_CONF = "retain:true"
```

## General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2

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.
```

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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## General Notes (Continued)

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

## Platform Notes

```
 BIOS settings:
 Operating Mode set to Custom Mode
 Core Performance Boost set to Disable
 Memory Speed set to 3200MHz
 SOC P-States set to P1
 NUMA nodes per socket set to NPS4
 ACPI SRAT L3 Cache as NUMA Domain set to Enable
 L1 Stream HW Prefetcher set to Disable
 Memory interleaving set to Disabled

 Sysinfo program /home/cpu2017-1.1.5-amd-aocc300-milan-A1/bin/sysinfo
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
 running on localhost Sun Feb 21 17:40:09 2021

 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 7713 64-Core Processor
       2  "physical id"s (chips)
       256 "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 : 64
       siblings  : 128
       physical 0: cores 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
       physical 1: cores 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

 From lscpu:
       Architecture:         x86_64
       CPU op-mode(s):       32-bit, 64-bit
       Byte Order:           Little Endian
       Address sizes:        48 bits physical, 48 bits virtual
```

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## Platform Notes (Continued)

```
CPU(s):              256
On-line CPU(s) list: 0-255
Thread(s) per core:  2
Core(s) per socket:  64
Socket(s):           2
NUMA node(s):        16
Vendor ID:           AuthenticAMD
CPU family:          25
Model:               1
Model name:          AMD EPYC 7713 64-Core Processor
Stepping:            1
CPU MHz:             1722.447
CPU max MHz:         2000.0000
CPU min MHz:         1500.0000
BogoMIPS:            3992.68
Virtualization:      AMD-V
L1d cache:           32K
L1i cache:           32K
L2 cache:            512K
L3 cache:            32768K
NUMA node0 CPU(s):   0-7,128-135
NUMA node1 CPU(s):   8-15,136-143
NUMA node2 CPU(s):   16-23,144-151
NUMA node3 CPU(s):   24-31,152-159
NUMA node4 CPU(s):   32-39,160-167
NUMA node5 CPU(s):   40-47,168-175
NUMA node6 CPU(s):   48-55,176-183
NUMA node7 CPU(s):   56-63,184-191
NUMA node8 CPU(s):   64-71,192-199
NUMA node9 CPU(s):   72-79,200-207
NUMA node10 CPU(s):  80-87,208-215
NUMA node11 CPU(s):  88-95,216-223
NUMA node12 CPU(s):  96-103,224-231
NUMA node13 CPU(s):  104-111,232-239
NUMA node14 CPU(s):  112-119,240-247
NUMA node15 CPU(s):  120-127,248-255
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 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 vmmcall fsgsbase
bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
```

**(Continued on next page)**

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```
     clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
     vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif
     umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

 /proc/cpuinfo cache data
    cache size : 512 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 16 nodes (0-15)
   node 0 cpus: 0 1 2 3 4 5 6 7 128 129 130 131 132 133 134 135
   node 0 size: 32064 MB
   node 0 free: 31584 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
   node 1 size: 32250 MB
   node 1 free: 31966 MB
   node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
   node 2 size: 32218 MB
   node 2 free: 32041 MB
   node 3 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
   node 3 size: 32250 MB
   node 3 free: 32089 MB
   node 4 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
   node 4 size: 32252 MB
   node 4 free: 32038 MB
   node 5 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
   node 5 size: 32250 MB
   node 5 free: 32081 MB
   node 6 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
   node 6 size: 32252 MB
   node 6 free: 32079 MB
   node 7 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
   node 7 size: 32238 MB
   node 7 free: 32063 MB
   node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199
   node 8 size: 32252 MB
   node 8 free: 32111 MB
   node 9 cpus: 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207
   node 9 size: 32250 MB
   node 9 free: 32113 MB
   node 10 cpus: 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215
   node 10 size: 32252 MB
   node 10 free: 32122 MB
   node 11 cpus: 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223
   node 11 size: 32250 MB
```

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## Platform Notes (Continued)

```
   node 11 free: 32114 MB
   node 12 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
   node 12 size: 32252 MB
   node 12 free: 32106 MB
   node 13 cpus: 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239
   node 13 size: 32250 MB
   node 13 free: 32121 MB
   node 14 cpus: 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247
   node 14 size: 32252 MB
   node 14 free: 32121 MB
   node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
   node 15 size: 32248 MB
   node 15 free: 32114 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
     1:  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
     2:  12  12  10  11  12  12  12  12  32  32  32  32  32  32  32  32
     3:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
     4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
     5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
     6:  12  12  12  12  12  12  10  11  32  32  32  32  32  32  32  32
     7:  12  12  12  12  12  12  11  10  32  32  32  32  32  32  32  32
     8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
     9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
    10:  32  32  32  32  32  32  32  32  12  12  10  11  12  12  12  12
    11:  32  32  32  32  32  32  32  32  12  12  11  10  12  12  12  12
    12:  32  32  32  32  32  32  32  32  12  12  12  12  10  11  12  12
    13:  32  32  32  32  32  32  32  32  12  12  12  12  11  10  12  12
    14:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
    15:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10

 From /proc/meminfo
    MemTotal:       528162036 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-SP2"
       VERSION_ID="15.2"
```

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

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

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

## Platform Notes (Continued)

```
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
   Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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 and
                                                   seccomp
CVE-2017-5753 (Spectre variant 1):                 Mitigation: usercopy/swapgs
                                                   barriers and __user pointer
                                                   sanitization
CVE-2017-5715 (Spectre variant 2):                 Mitigation: Full AMD retpoline,
                                              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 Feb 21 17:36

SPEC is set to: /home/cpu2017-1.1.5-amd-aocc300-milan-A1
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda3       xfs   889G   53G  836G   6% /

From /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SR645 MB
    Product Family: ThinkSystem
    Serial:         1234567890

Additional information from dmidecode 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:
```

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

SPECrate®2017_fp_base =             502
SPECrate®2017_fp_energy_base = 1310
SPECrate®2017_fp_peak =             536
SPECrate®2017_fp_energy_peak = 1400

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
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**Test Date:** Feb-2021
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**Software Availability:** Mar-2021

## Platform Notes (Continued)

```
     16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200
     16x Unknown Unknown

 BIOS:
    BIOS Vendor:        Lenovo
    BIOS Version:       D8E115B-2.00
    BIOS Date:          02/02/2021
    BIOS Revision:      2.0
    Firmware Revision: 3.0

 (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C                    | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                     | 544.nab_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++                  | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C               | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
```

## Lenovo Global Technology

### ThinkSystem SR645
### 2.00 GHz, AMD EPYC 7713

SPECrate®2017_fp_base = 502

SPECrate®2017_fp_energy_base = 1310

SPECrate®2017_fp_peak = 536

SPECrate®2017_fp_energy_peak = 1400

| | | | |
|---|---|---|---|
| **CPU2017 License:** 9017 | | **Test Date:** | Feb-2021 |
| **Test Sponsor:** | Lenovo Global Technology | **Hardware Availability:** | Mar-2021 |
| **Tested by:** | Lenovo Global Technology | **Software Availability:** | Mar-2021 |

## Compiler Version Notes (Continued)

```
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
-------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
-------------------------------------------------------------------------


==============================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                 | 554.roms_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
-------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
```

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

## Compiler Version Notes (Continued)

```
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

Benchmarks using Fortran, C, and C++:
`clang++ clang flang`

## Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
526.blender_r: `-funsigned-char -D__BOOL_DEFINED -DSPEC_LP64`
527.cam4_r: `-DSPEC_CASE_FLAG -DSPEC_LP64`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`

**(Continued on next page)**

| | |
|---|---|
| **Lenovo Global Technology** | SPECrate®2017_fp_base = 502 |
| | SPECrate®2017_fp_energy_base = 1310 |
| ThinkSystem SR645 | SPECrate®2017_fp_peak = 536 |
| 2.00 GHz, AMD EPYC 7713 | SPECrate®2017_fp_energy_peak = 1400 |

| | | | |
|---|---|---|---|
| **CPU2017 License:** 9017 | | **Test Date:** | Feb-2021 |
| **Test Sponsor:** | Lenovo Global Technology | **Hardware Availability:** | Mar-2021 |
| **Tested by:** | Lenovo Global Technology | **Software Availability:** | Mar-2021 |

# Base Portability Flags (Continued)

549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

# Base Optimization Flags

C benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

C++ benchmarks:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -z muldefs -lamdlibm -ljemalloc
```

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

SPECrate®2017_fp_base = 502
SPECrate®2017_fp_energy_base = 1310
SPECrate®2017_fp_peak = 536
SPECrate®2017_fp_energy_peak = 1400

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

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

# Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-lflang -lflangrti
```

Benchmarks using both Fortran and C:
```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1
-Kieee -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using both C and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
```

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

**CPU2017 License:** 9017
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**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

# Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Kieee -Mrecursive -mllvm -fuse-tile-inner-loop
-funroll-loops -mllvm -lsr-in-nested-loop -z muldefs -lamdlibm
-ljemalloc -lflang -lflangrti
```

# Base Other Flags

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

C++ benchmarks:
```
-Wno-unused-command-line-argument
```

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

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

Benchmarks using both C and C++:
```
-Wno-unused-command-line-argument
```

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

# Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result

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## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

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

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

# Peak Compiler Invocation (Continued)

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

Benchmarks using both C and C++:
```
clang++ clang
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

# Peak Portability Flags

```
Same as Base Portability Flags
```

# Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -m64 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

```
538.imagick_r: Same as 519.lbm_r
```

```
544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
```

**(Continued on next page)**

Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/

## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

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

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

# Peak Optimization Flags (Continued)

544.nab_r (continued):
```
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

C++ benchmarks:

508.namd_r: `-m64 -std=c++98 -mno-adx -mno-sse4a`
```
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

510.parest_r: `-m64 -std=c++98 -mno-adx -mno-sse4a`
```
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

Fortran benchmarks:

503.bwaves_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
```
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang -lflangrti
```

549.fotonik3d_r: `Same as 503.bwaves_r`

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| | |
|---|---|
| **Lenovo Global Technology** | SPECrate®2017_fp_base = 502 |
| | SPECrate®2017_fp_energy_base = 1310 |
| ThinkSystem SR645 | SPECrate®2017_fp_peak = 536 |
| 2.00 GHz, AMD EPYC 7713 | SPECrate®2017_fp_energy_peak = 1400 |

| | | | |
|---|---|---|---|
| **CPU2017 License:** 9017 | | **Test Date:** | Feb-2021 |
| **Test Sponsor:** | Lenovo Global Technology | **Hardware Availability:** | Mar-2021 |
| **Tested by:** | Lenovo Global Technology | **Software Availability:** | Mar-2021 |

# Peak Optimization Flags (Continued)

554.roms_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp`
`-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm`
`-ljemalloc -lflang -lflangrti`

Benchmarks using both Fortran and C:

521.wrf_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays`
`-flv-function-specialization -mllvm -inline-threshold=1000`
`-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true`
`-mllvm -function-specialize -mllvm -enable-licm-vrp`
`-mllvm -reduce-array-computations=3 -Kieee -Mrecursive`
`-lamdlibm -ljemalloc -lflang -lflangrti`

527.cam4_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays`
`-flv-function-specialization -mllvm -inline-threshold=1000`
`-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true`
`-mllvm -function-specialize -mllvm -enable-licm-vrp`
`-mllvm -reduce-array-computations=3 -O3 -ffast-math`
`-funroll-loops -mllvm -extra-vectorizer-passes`
`-mllvm -lsr-in-nested-loop -Mrecursive -lamdlibm`
`-ljemalloc -lflang -lflangrti`

Benchmarks using both C and C++:
`-m64 -std=c++98 -mno-adx -mno-sse4a`
`-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp`
`-flto -Wl,-mllvm -Wl,-function-specialize`

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## Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

SPECrate®2017_fp_base = 502
SPECrate®2017_fp_energy_base = 1310
SPECrate®2017_fp_peak = 536
SPECrate®2017_fp_energy_peak = 1400

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

**Test Date:** Feb-2021
**Hardware Availability:** Mar-2021
**Software Availability:** Mar-2021

# Peak Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
```
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Kieee -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```

# Peak Other Flags

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

C++ benchmarks:
```
-Wno-unused-command-line-argument
```

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

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

Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

| | |
|---|---|
| SPECrate®2017_fp_base = | 502 |
| SPECrate®2017_fp_energy_base = | 1310 |
| SPECrate®2017_fp_peak = | 536 |
| SPECrate®2017_fp_energy_peak = | 1400 |

| | | | |
|---|---|---|---|
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| **Test Sponsor:** | Lenovo Global Technology | **Hardware Availability:** | Mar-2021 |
| **Tested by:** | Lenovo Global Technology | **Software Availability:** | Mar-2021 |

# Peak Other Flags (Continued)

Benchmarks using both C and C++:

`-Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:

`-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-Milan-C.html`
`http://www.spec.org/cpu2017/flags/aocc300-flags-A1.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-Milan-C.xml`
`http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml`

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

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