



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

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

SPECspeed®2017\_fp\_base = 188

SPECspeed®2017\_fp\_energy\_base = 593

SPECspeed®2017\_fp\_peak = 191

SPECspeed®2017\_fp\_energy\_peak = 601

CPU2017 License: 9017

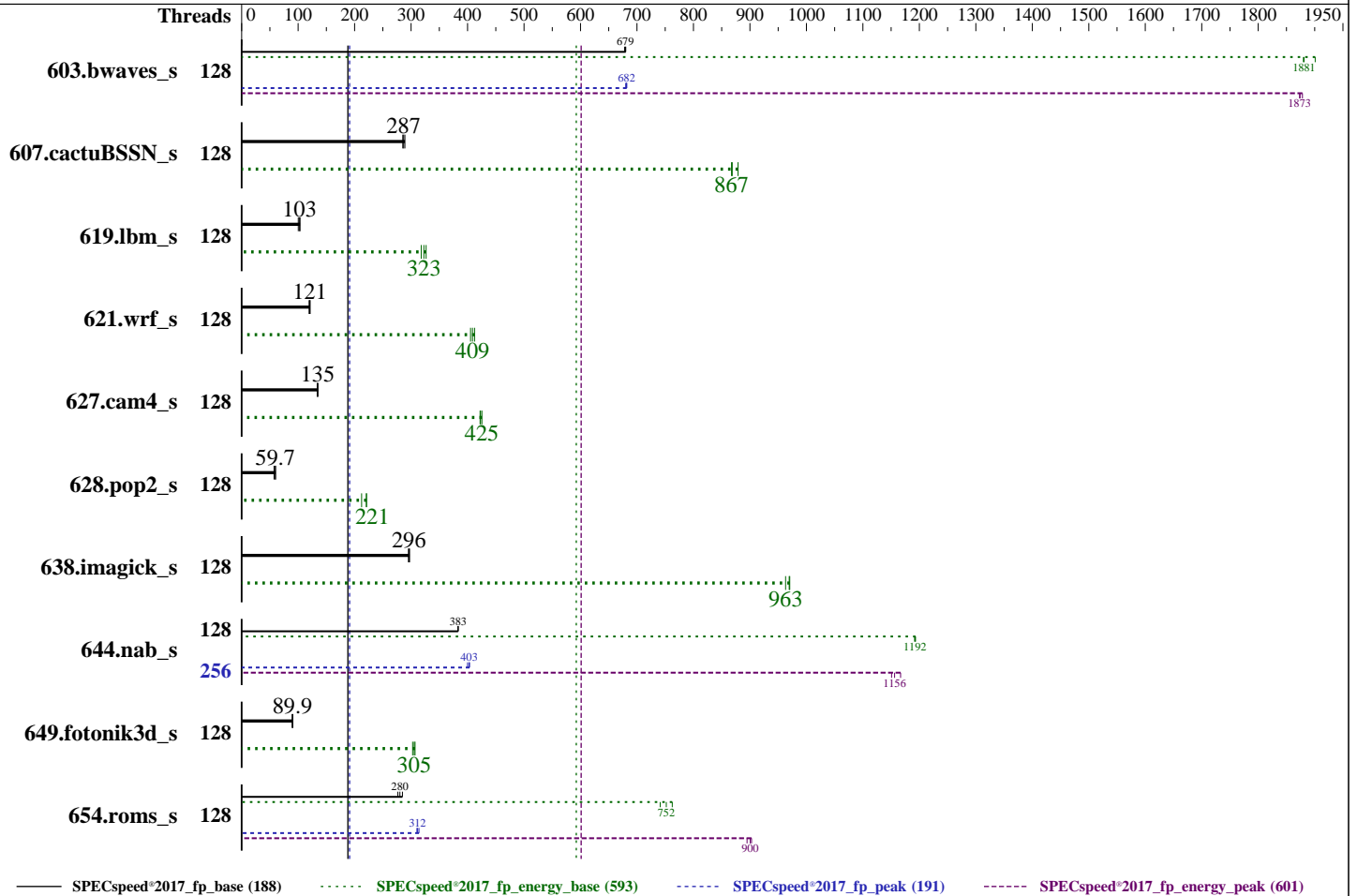
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021



### Hardware

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

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: Yes  
 Firmware: Lenovo BIOS Version D8E115B 2.00 released Feb-2021  
 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



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### Power

Max. Power (W): 436.53  
Idle Power (W): 190.32  
Min. Temperature (C): 23.31  
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 #: 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 #: 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	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	128	87.0	678	33.9	1900	389	402	<b>86.8</b>	<b>679</b>	<b>34.2</b>	<b>1880</b>	<b>394</b>	<b>407</b>	86.7	680	34.2	1880	395	407
607.cactuBSSN_s	128	57.7	289	20.7	879	360	376	58.4	285	21.0	869	359	376	<b>58.1</b>	<b>287</b>	<b>21.0</b>	<b>867</b>	<b>362</b>	<b>376</b>
619.lbm_s	128	52.2	100	18.7	318	358	407	<b>51.1</b>	<b>103</b>	<b>18.4</b>	<b>323</b>	<b>361</b>	<b>413</b>	50.7	103	18.2	327	359	418
621.wrf_s	128	109	121	35.0	412	321	327	<b>110</b>	<b>121</b>	<b>35.3</b>	<b>409</b>	<b>323</b>	<b>329</b>	111	119	35.6	405	322	327
627.cam4_s	128	<b>65.8</b>	<b>135</b>	<b>22.7</b>	<b>425</b>	<b>344</b>	<b>386</b>	66.3	134	22.8	422	345	390	65.6	135	22.8	423	347	390
628.pop2_s	128	<b>199</b>	<b>59.7</b>	<b>59.1</b>	<b>221</b>	<b>297</b>	<b>303</b>	207	57.4	61.4	212	297	303	198	60.0	59.0	221	298	304
638.imagick_s	128	48.5	297	16.2	970	334	427	48.8	295	16.2	970	332	421	<b>48.7</b>	<b>296</b>	<b>16.3</b>	<b>963</b>	<b>335</b>	<b>424</b>
644.nab_s	128	45.6	383	15.9	1190	349	378	<b>45.6</b>	<b>383</b>	<b>15.9</b>	<b>1190</b>	<b>350</b>	<b>374</b>	45.6	383	16.0	1190	350	377
649.fotonik3d_s	128	102	89.5	33.8	303	332	375	<b>101</b>	<b>89.9</b>	<b>33.5</b>	<b>305</b>	<b>331</b>	<b>374</b>	101	90.6	33.3	307	331	375
654.roms_s	128	56.9	277	23.8	741	417	437	<b>56.2</b>	<b>280</b>	<b>23.4</b>	<b>752</b>	<b>417</b>	<b>435</b>	55.3	285	23.1	762	417	436

SPECspeed®2017\_fp\_base = **188**

SPECspeed®2017\_fp\_energy\_base = **593**

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	128	<b>86.6</b>	<b>682</b>	<b>34.4</b>	<b>1870</b>	<b>397</b>	<b>409</b>	86.5	682	34.3	1870	397	409	86.8	680	34.3	1880	395	407
607.cactuBSSN_s	128	57.7	289	20.7	879	360	376	58.4	285	21.0	869	359	376	<b>58.1</b>	<b>287</b>	<b>21.0</b>	<b>867</b>	<b>362</b>	<b>376</b>
619.lbm_s	128	52.2	100	18.7	318	358	407	<b>51.1</b>	<b>103</b>	<b>18.4</b>	<b>323</b>	<b>361</b>	<b>413</b>	50.7	103	18.2	327	359	418
621.wrf_s	128	109	121	35.0	412	321	327	<b>110</b>	<b>121</b>	<b>35.3</b>	<b>409</b>	<b>323</b>	<b>329</b>	111	119	35.6	405	322	327
627.cam4_s	128	<b>65.8</b>	<b>135</b>	<b>22.7</b>	<b>425</b>	<b>344</b>	<b>386</b>	66.3	134	22.8	422	345	390	65.6	135	22.8	423	347	390
628.pop2_s	128	<b>199</b>	<b>59.7</b>	<b>59.1</b>	<b>221</b>	<b>297</b>	<b>303</b>	207	57.4	61.4	212	297	303	198	60.0	59.0	221	298	304
638.imagick_s	128	48.5	297	16.2	970	334	427	48.8	295	16.2	970	332	421	<b>48.7</b>	<b>296</b>	<b>16.3</b>	<b>963</b>	<b>335</b>	<b>424</b>
644.nab_s	256	43.7	400	16.5	1150	378	408	43.3	403	16.3	1170	376	409	<b>43.4</b>	<b>403</b>	<b>16.4</b>	<b>1160</b>	<b>379</b>	<b>408</b>
649.fotonik3d_s	128	102	89.5	33.8	303	332	375	<b>101</b>	<b>89.9</b>	<b>33.5</b>	<b>305</b>	<b>331</b>	<b>374</b>	101	90.6	33.3	307	331	375
654.roms_s	128	<b>50.5</b>	<b>312</b>	<b>19.5</b>	<b>900</b>	<b>387</b>	<b>416</b>	50.7	310	19.7	895	388	421	50.2	314	19.5	903	389	421

SPECspeed®2017\_fp\_peak = 191

SPECspeed®2017\_fp\_energy\_peak = 601

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
'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.
```

To enable Transparent Hugepages (THP) for all allocations,

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## 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 enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
```

## Environment Variables Notes

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

```
GOMP_CPU_AFFINITY = "0-255"
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.5-amd-aocc300-milan-A1/amd_speed_aocc300_milan_A_lib/
64/home/cpu2017-1.1.5-amd-aocc300-milan-A1/amd_speed_aocc300_milan_A_li
b/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "256"
```

Environment variables set by runcpu during the 603.bwaves\_s peak run:

```
GOMP_CPU_AFFINITY = "0-127"
```

Environment variables set by runcpu during the 644.nab\_s peak run:

```
GOMP_CPU_AFFINITY = "0 128 1 129 2 130 3 131 4 132 5 133 6 134 7 135 8 136 9
137 10 138 11 139 12 140 13 141 14 142 15 143 16 144 17 145 18 146 19
147 20 148 21 149 22 150 23 151 24 152 25 153 26 154 27 155 28 156 29
157 30 158 31 159 32 160 33 161 34 162 35 163 36 164 37 165 38 166 39
167 40 168 41 169 42 170 43 171 44 172 45 173 46 174 47 175 48 176 49
177 50 178 51 179 52 180 53 181 54 182 55 183 56 184 57 185 58 186 59
187 60 188 61 189 62 190 63 191 64 192 65 193 66 194 67 195 68 196 69
197 70 198 71 199 72 200 73 201 74 202 75 203 76 204 77 205 78 206 79
207 80 208 81 209 82 210 83 211 84 212 85 213 86 214 87 215 88 216 89
217 90 218 91 219 92 220 93 221 94 222 95 223 96 224 97 225 98 226 99
227 100 228 101 229 102 230 103 231 104 232 105 233 106 234 107 235 108
236 109 237 110 238 111 239 112 240 113 241 114 242 115 243 116 244 117
245 118 246 119 247 120 248 121 249 122 250 123 251 124 252 125 253 126
254 127 255"
```

Environment variables set by runcpu during the 654.roms\_s peak run:

```
GOMP_CPU_AFFINITY = "0-127"
```



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## 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.

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

Sysinfo program /home/cpu2017-1.1.5-amd-aocc300-milan-A1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost Fri Feb 26 00:59:36 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

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## Platform Notes (Continued)

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
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):          2
Vendor ID:              AuthenticAMD
CPU family:             25
Model:                  1
Model name:             AMD EPYC 7713 64-Core Processor
Stepping:               1
CPU MHz:                1796.250
CPU max MHz:           2000.0000
CPU min MHz:           1500.0000
BogoMIPS:               3992.85
Virtualization:        AMD-V
L1d cache:              32K
L1i cache:              32K
L2 cache:               512K
L3 cache:               32768K
NUMA node0 CPU(s):     0-63,128-191
NUMA node1 CPU(s):     64-127,192-255
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 cxl6 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
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.

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## Platform Notes (Continued)

```
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 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 63 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143
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: 257782 MB
node 0 free: 256344 MB
node 1 cpus: 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
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 192 193 194 195 196 197 198
199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220
221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242
243 244 245 246 247 248 249 250 251 252 253 254 255
node 1 size: 258012 MB
node 1 free: 257087 MB
node distances:
node 0 1
0: 10 32
1: 32 10
```

```
From /proc/meminfo
MemTotal: 528173864 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"
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
```

(Continued on next page)



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## Platform Notes (Continued)

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 25 21:39

```

SPEC is set to: /home/cpu2017-1.1.5-amd-aocc300-milan-A1
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb3       xfs   889G  54G  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:
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

```

(Continued on next page)





# SPEC CPU®2017 Floating Point Speed Result

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

SPECSpeed®2017\_fp\_base = 188  
SPECSpeed®2017\_fp\_energy\_base = 593  
SPECSpeed®2017\_fp\_peak = 191  
SPECSpeed®2017\_fp\_energy\_peak = 601

**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)

(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 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, Fortran | 607.cactuBSSN\_s(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 | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak)  
| 654.roms\_s(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)



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**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Compiler Version Notes (Continued)

-----  
=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak)  
628.pop2\_s(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  
-----

## 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

627.cam4\_s: -DSPEC\_CASE\_FLAG -DSPEC\_LP64

628.pop2\_s: -DSPEC\_CASE\_FLAG -Mbyteswapio -DSPEC\_LP64

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**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 Portability Flags (Continued)

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 -mno-adx -mno-sse4a -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 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti
```

Fortran benchmarks:

```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -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
-march=znver3 -fveclib=AMDLIBM -ffast-math -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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using both Fortran and C:

```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -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 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -mllvm -function-specialize -flv-function-specialization
```

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**CPU2017 License:** 9017

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**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2021

**Hardware Availability:** Mar-2021

**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti
```

Benchmarks using Fortran, C, and C++:

```
-m64 -mno-adx -mno-sse4a -std=c++98
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-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 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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
-Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -lsr-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
```

## Base Other Flags

C benchmarks:

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

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

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



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

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

## 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: -m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize  
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3  
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5  
-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 -DSPEC\_OPENMP -fopenmp  
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

603.bwaves\_s: -m64 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp

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**Test Date:** Feb-2021

**Hardware Availability:** Mar-2021

**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

603.bwaves\_s (continued):

```
-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 -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang
```

649.fotonik3d\_s: basepeak = yes

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

Benchmarks using both Fortran and C:

621.wrf\_s: basepeak = yes

627.cam4\_s: basepeak = yes

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_s: basepeak = yes

## Peak Other Flags

C benchmarks:

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

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

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



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The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-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>

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