



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Lenovo Global Technology ThinkSystem SR655 2.00 GHz, AMD EPYC 7713P

SPECspeed®2017\_fp\_base = 127

SPECspeed®2017\_fp\_energy\_base = 741

SPECspeed®2017\_fp\_peak = 131

SPECspeed®2017\_fp\_energy\_peak = 758

CPU2017 License: 9017

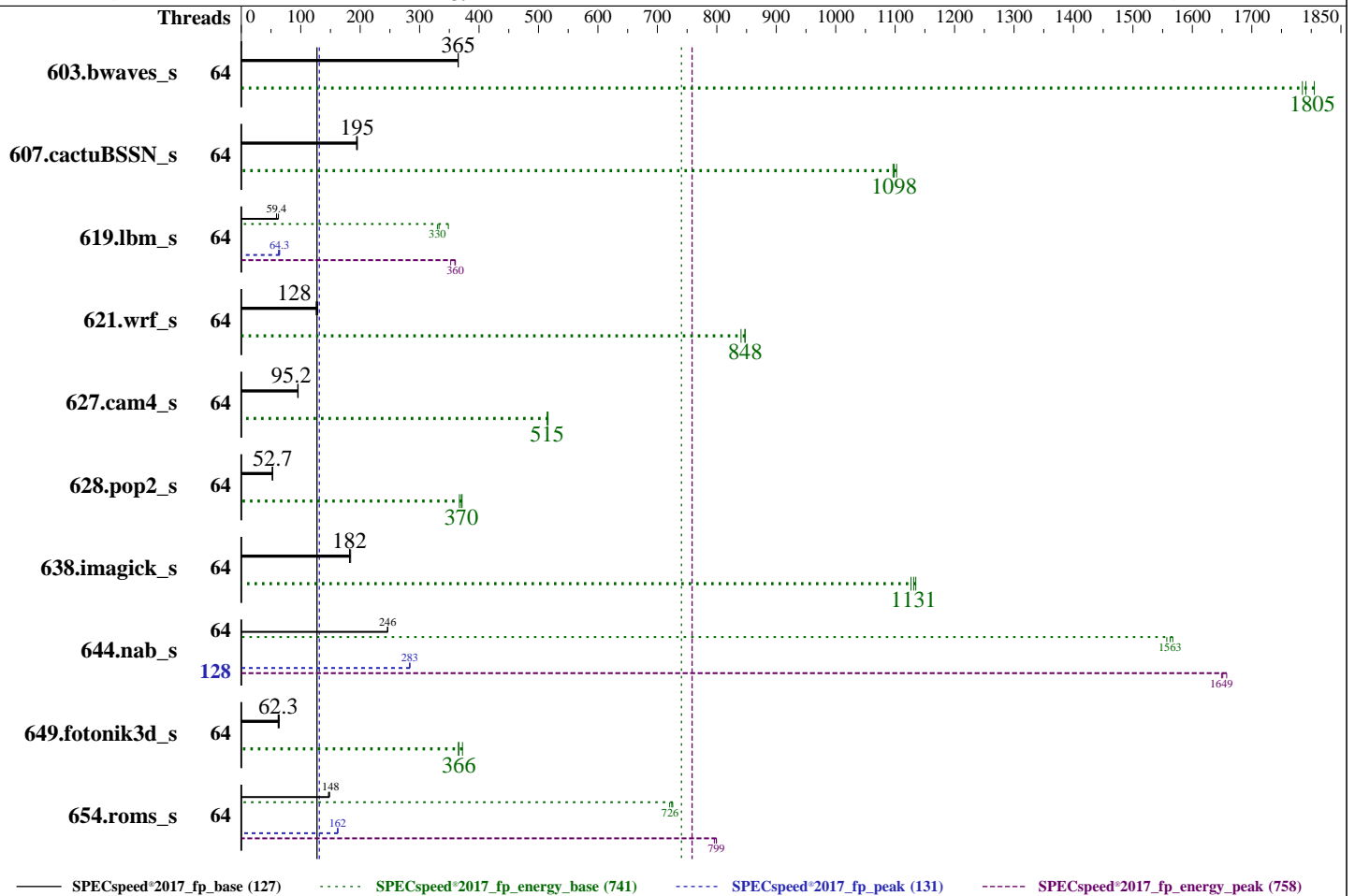
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: May-2021

Hardware Availability: Jun-2021

Software Availability: Mar-2021



### Hardware

CPU Name: AMD EPYC 7713P  
 Max MHz: 3675  
 Nominal: 2000  
 Enabled: 64 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 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: 256 GB (8 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 CFE125S 6.0 released May-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 and OS set to balance power and performance



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### Power

Max. Power (W): 238.49  
Idle Power (W): 94.18  
Min. Temperature (C): 22.81  
Elevation (m): 43  
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
Provisioning: Line-powered

### Power Settings

Management FW: Version 4.11 of AMBT23L  
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 750 W (non-redundant)  
Details: ThinkSystem 750W Titanium Power Supply 7N67A00884  
Backplane: 8 x 2.5-inch HDD back plane  
Other Storage: None  
Storage Model #: 4XB7A10239  
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 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: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: Connected to PSU1  
Current Ranges Used: 1A  
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: 1.9.2 (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	64	<b>162</b>	<b>365</b>	<b>35.7</b>	<b>1810</b>	<b>221</b>	<b>225</b>	162	365	35.9	1790	222	228	162	365	36.1	1790	223	229
607.cactuBSSN_s	64	86.0	194	16.6	1100	193	208	85.4	195	16.5	1100	194	208	<b>85.5</b>	<b>195</b>	<b>16.6</b>	<b>1100</b>	<b>194</b>	<b>210</b>
619.lbm_s	64	88.4	59.3	17.9	333	202	223	83.8	62.5	17.1	348	204	226	<b>88.2</b>	<b>59.4</b>	<b>18.0</b>	<b>330</b>	<b>204</b>	<b>225</b>
621.wrf_s	64	105	126	17.2	841	164	165	<b>104</b>	<b>128</b>	<b>17.0</b>	<b>848</b>	<b>164</b>	<b>166</b>	103	128	17.0	847	165	167
627.cam4_s	64	93.2	95.1	18.7	516	200	237	<b>93.1</b>	<b>95.2</b>	<b>18.7</b>	<b>515</b>	<b>201</b>	<b>237</b>	92.6	95.7	18.7	515	202	238
628.pop2_s	64	225	52.7	35.1	371	156	160	228	52.0	35.6	367	156	162	<b>225</b>	<b>52.7</b>	<b>35.3</b>	<b>370</b>	<b>157</b>	<b>161</b>
638.imagick_s	64	78.4	184	13.9	1130	177	200	<b>79.2</b>	<b>182</b>	<b>13.9</b>	<b>1130</b>	<b>176</b>	<b>201</b>	79.3	182	14.0	1130	176	201
644.nab_s	64	70.9	246	12.1	1570	171	179	<b>70.9</b>	<b>246</b>	<b>12.2</b>	<b>1560</b>	<b>171</b>	<b>179</b>	71.0	246	12.2	1560	172	180
649.fotonik3d_s	64	<b>146</b>	<b>62.3</b>	<b>28.0</b>	<b>366</b>	<b>191</b>	<b>209</b>	143	63.8	27.5	372	193	211	147	62.1	28.0	365	191	210
654.roms_s	64	107	147	24.4	721	228	235	106	148	24.3	724	229	235	<b>106</b>	<b>148</b>	<b>24.3</b>	<b>726</b>	<b>228</b>	<b>234</b>

SPECspeed®2017\_fp\_base = 127

SPECspeed®2017\_fp\_energy\_base = 741

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



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**Test Date:** May-2021  
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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	64	<b>162</b>	<b>365</b>	<b>35.7</b>	<b>1810</b>	<b>221</b>	<b>225</b>	162	365	35.9	1790	222	228	162	365	36.1	1790	223	229
607.cactuBSSN_s	64	86.0	194	16.6	1100	193	208	85.4	195	16.5	1100	194	208	<b>85.5</b>	<b>195</b>	<b>16.6</b>	<b>1100</b>	<b>194</b>	<b>210</b>
619.lbm_s	64	83.7	62.6	16.9	352	202	223	81.4	64.3	16.6	359	203	224	<b>81.5</b>	<b>64.3</b>	<b>16.5</b>	<b>360</b>	<b>203</b>	<b>223</b>
621.wrf_s	64	105	126	17.2	841	164	165	<b>104</b>	<b>128</b>	<b>17.0</b>	<b>848</b>	<b>164</b>	<b>166</b>	103	128	17.0	847	165	167
627.cam4_s	64	93.2	95.1	18.7	516	200	237	<b>93.1</b>	<b>95.2</b>	<b>18.7</b>	<b>515</b>	<b>201</b>	<b>237</b>	92.6	95.7	18.7	515	202	238
628.pop2_s	64	225	52.7	35.1	371	156	160	228	52.0	35.6	367	156	162	<b>225</b>	<b>52.7</b>	<b>35.3</b>	<b>370</b>	<b>157</b>	<b>161</b>
638.imagick_s	64	78.4	184	13.9	1130	177	200	<b>79.2</b>	<b>182</b>	<b>13.9</b>	<b>1130</b>	<b>176</b>	<b>201</b>	79.3	182	14.0	1130	176	201
644.nab_s	128	61.6	284	11.5	1650	187	198	61.7	283	11.5	1660	186	197	<b>61.6</b>	<b>283</b>	<b>11.5</b>	<b>1650</b>	<b>187</b>	<b>197</b>
649.fotonik3d_s	64	<b>146</b>	<b>62.3</b>	<b>28.0</b>	<b>366</b>	<b>191</b>	<b>209</b>	143	63.8	27.5	372	193	211	147	62.1	28.0	365	191	210
654.roms_s	64	97.2	162	22.1	796	228	235	<b>97.1</b>	<b>162</b>	<b>22.0</b>	<b>799</b>	<b>227</b>	<b>235</b>	97.0	162	22.0	799	227	235

SPECspeed®2017\_fp\_peak = **131**

SPECspeed®2017\_fp\_energy\_peak = **758**

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,

(Continued on next page)



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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 = "0-127"
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.7-amd-aocc300-milan-B1/amd_speed_aocc300_milan_B_lib/
64;/home/cpu2017-1.1.7-amd-aocc300-milan-B1/amd_speed_aocc300_milan_B_li
b/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "128"
```

```
Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-63"
```

```
Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74
11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86
23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98
35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45
109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55
119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"
```

```
Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-63"
```

## 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)

(Continued on next page)



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## General Notes (Continued)

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:  
Core Performance Boost set to Disabled  
NUMA nodes per socket set to NPS2  
Memory Speed set to Auto

Sysinfo program /home/cpu2017-1.1.7-amd-aocc300-milan-B1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost Fri Apr 17 21:21:43 2020

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 7713P 64-Core Processor  
1 "physical id"s (chips)  
128 "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

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): 128  
On-line CPU(s) list: 0-127  
Thread(s) per core: 2

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## Platform Notes (Continued)

```
Core(s) per socket: 64
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7713P 64-Core Processor
Stepping: 1
CPU MHz: 1796.053
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 3992.23
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-31,64-95
NUMA node1 CPU(s): 32-63,96-127
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 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.

```
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 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
node 0 size: 128821 MB
node 0 free: 128087 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
```

(Continued on next page)



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## Platform Notes (Continued)

```
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
node 1 size: 128960 MB
node 1 free: 128187 MB
node distances:
node  0  1
  0:  10 12
  1:  12 10
```

```
From /proc/meminfo
MemTotal:      263968536 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

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

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 15 SP2
```

```
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
```

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
```

(Continued on next page)





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## Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): sanitization  
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 Apr 17 21:13

SPEC is set to: /home/cpu2017-1.1.7-amd-aocc300-milan-B1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/md126p3 xfs 892G 34G 858G 4% /

From /sys/devices/virtual/dmi/id  
Vendor: Lenovo  
Product: ThinkSystem SR655 -[7Y00000000]-  
Product Family: ThinkSystem  
Serial: 0123456789

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:  
8x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200  
8x Unknown Unknown

BIOS:  
BIOS Vendor: Lenovo  
BIOS Version: CFE125S  
BIOS Date: 05/11/2021  
BIOS Revision: 6.0

(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

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# SPEC CPU®2017 Floating Point Speed Result

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**Lenovo Global Technology**  
**ThinkSystem SR655**  
**2.00 GHz, AMD EPYC 7713P**

SPECSpeed®2017\_fp\_base = 127  
SPECSpeed®2017\_fp\_energy\_base = 741  
SPECSpeed®2017\_fp\_peak = 131  
SPECSpeed®2017\_fp\_energy\_peak = 758

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

**Test Date:** May-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

## Compiler Version Notes (Continued)

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

=====  
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)

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**Test Date:** May-2021  
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**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  
-----

## 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  
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

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**Tested by:** Lenovo Global Technology

**Test Date:** May-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

C benchmarks (continued):

```
-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
-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
```

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**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** May-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-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
```

## Peak Compiler Invocation

C benchmarks:

```
clang
```

Fortran benchmarks:

```
flang
```

Benchmarks using both Fortran and C:

```
flang clang
```

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**Tested by:** Lenovo Global Technology

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**Software Availability:** Mar-2021

## Peak Compiler Invocation (Continued)

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

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
619.lbm_s: -m64 -mno-adx -mno-sse4a
-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 -flto
-fstruct-layout=5 -mllvm -unroll-threshold=50
-freemap-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

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 -freemap-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
```

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**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** May-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

Fortran benchmarks:

603.bwaves\_s: basepeak = yes

649.fotonik3d\_s: basepeak = yes

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

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

(Continued on next page)



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## Peak Other Flags (Continued)

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

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-Milan1P-G.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-Milan1P-G.xml>  
<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

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