# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology
**ThinkSystem SR655**  
**2.60 GHz, AMD EPYC 7H12**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>May-2020</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jun-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2019</td>
</tr>
</tbody>
</table>

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>136</td>
<td>142</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>223</td>
<td>253</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>31.6</td>
<td>42.3</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>157</td>
<td>253</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>90.5</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>73.1</td>
<td>90.5</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>253</td>
<td>253</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>128</td>
<td>343</td>
<td>343</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>379</td>
<td>379</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>149</td>
<td>149</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** AMD EPYC 7H12  
- **Max MHz:** 3300  
- **Nominal:** 2600  
- **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, 16 MB shared / 4 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 SP1 (x86_64)  
- **Kernel:** 4.12.14-195-default  
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version CFE111B released Feb-2020  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage  
- **Other:** jemalloc: jemalloc memory allocator library v5.1.0
# Lenovo Global Technology

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---

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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>172</td>
<td><strong>343</strong></td>
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<td>343</td>
<td>172</td>
<td>342</td>
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<td>172</td>
<td>342</td>
<td>172</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>74.9</td>
<td><strong>223</strong></td>
<td>74.7</td>
<td>223</td>
<td>76.0</td>
<td>219</td>
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<td>76.0</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
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<td><strong>31.6</strong></td>
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<td>31.6</td>
<td>166</td>
<td>31.6</td>
<td>128</td>
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<td>42.3</td>
<td><strong>124</strong></td>
<td>42.3</td>
<td>124</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
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<td>157</td>
<td>84.7</td>
<td>156</td>
<td><strong>84.5</strong></td>
<td><strong>157</strong></td>
<td>64</td>
<td>84.4</td>
<td>157</td>
<td>84.7</td>
<td>156</td>
<td><strong>84.5</strong></td>
</tr>
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<td>64</td>
<td><strong>98.0</strong></td>
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<td>97.7</td>
<td>90.7</td>
<td>98.3</td>
<td>90.1</td>
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<td><strong>90.6</strong></td>
<td>97.9</td>
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<td>64</td>
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<td>73.0</td>
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<td>73.1</td>
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<td><strong>73.1</strong></td>
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<td>73.0</td>
<td>162</td>
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<td>638.imagick_s</td>
<td>64</td>
<td>57.4</td>
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<td>56.8</td>
<td>254</td>
<td>56.5</td>
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<td>66.2</td>
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<td><strong>105</strong></td>
<td><strong>151</strong></td>
<td>104</td>
<td>151</td>
<td>105</td>
</tr>
</tbody>
</table>

## SPECspeed®2017_fp_base = 136  
SPECspeed®2017_fp_peak = 142

### 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>

Set dirty_ratio=8 to limit dirty cache to 8% of memory  
Set swappiness=1 to swap only if necessary  
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory sync then drop_caches=3 to reset caches before invoking runcpu

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)
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Test Sponsor: Lenovo Global Technology
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<thead>
<tr>
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<td>142</td>
</tr>
</tbody>
</table>

Test Date: May-2020
Hardware Availability: Jun-2020
Software Availability: Dec-2019

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-amd-rome-aocc200-C3/amd_speed_aocc200_rome_C_lib/64
                      /home/cpu2017-1.1.0-amd-rome-aocc200-C3/amd_speed_aocc200_rome_C_lib/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 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 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 644.nab_s peak run:
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 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-63"

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 7601 CPU + 512GB Memory using Fedora 26

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
**General Notes (Continued)**

is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (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.  
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.  
jemalloc: configured and built with GCC v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto  
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: 
Set Operating Mode set to Maximum Performance

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C3/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edbl6e6a485a0011  
running on linux-01om Sat May 2 23:14:35 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 7H12 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: 43 bits physical, 48 bits virtual  
CPU(s): 128  
On-line CPU(s) list: 0-127
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SPECspeed®2017_fp_base = 136
SPECspeed®2017_fp_peak = 142

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Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 64
Socket(s): 1
NUMA node(s): 1
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7H12 64-Core Processor
Stepping: 0
CPU MHz: 2600.000
CPU max MHz: 2600.0000
CPU min MHz: 1500.0000
BogoMIPS: 5190.13
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-127
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 xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
pclmulqdq monitor extd_apicid monitor svm extaopt cr8_legacy abm misalignsse 3dnowprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb pbe xt perfctr_l2 mwaitx cpb
cat_13 cpd_13 hw_pstate sme ssbd sev ibrs ibp bb stibp vmmcall fsqsgbase bni avx2 smep
bmi2 cmq rdt_a rdseed advclmap cflushopt clwb sha_ni xsaveopt xsaves xsaveopt xsaves
xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_mtotal cqm_mbb_mlocal clobber irperf xsaverestr arat
npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter
pfthreshold avic v_vmsave_vmload vgif umip 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: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
  57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
  86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
  node 0 size: 257783 MB
  node 0 free: 256827 MB
  node distances:
    node 0
  0: 10
Lenovo Global Technology
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**SPECspeed®2017_fp_base = 136**
**SPECspeed®2017_fp_peak = 142**

### Platform Notes (Continued)

From `/proc/meminfo`

- MemTotal: 263970112 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`

```
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

```
uname -a:
Linux linux-01om 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

<table>
<thead>
<tr>
<th>CVE</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVE-2018-3620 (L1 Terminal Fault)</td>
<td>Not affected</td>
</tr>
<tr>
<td>Microarchitectural Data Sampling:</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2017-5754 (Meltdown):</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2018-3639 (Speculative Store Bypass):</td>
<td>Mitigation: Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>CVE-2017-5753 (Spectre variant 1):</td>
<td>Mitigation: __user pointer sanitization</td>
</tr>
<tr>
<td>CVE-2017-5715 (Spectre variant 2):</td>
<td>Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling</td>
</tr>
</tbody>
</table>

run-level 3 May 2 23:13

SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C3

```
<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>xfs</td>
<td>893G</td>
<td>89G</td>
<td>805G</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
```

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

```
BIOS: Lenovo CFE111B 02/11/2020
Vendor: Lenovo
Product: ThinkSystem SR655 -[7Y00000000]-
Product Family: ThinkSystem
Serial: 0123456789
```

Additional information from dmidecode follows. WARNING: Use caution when you interpret

(Continued on next page)
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Platform Notes (Continued)

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 M393A4K40DB2-CWE 32 kB 2 rank 3200
8x Unknown Unknown

(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)  
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
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Target: x86_64-unknown-linux-gnu
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Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)

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Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

Fortran, C  | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)

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_x: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR655
2.60 GHz, AMD EPYC 7H12

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

Test Date: May-2020
Hardware Availability: Jun-2020
Software Availability: Dec-2019

Base Portability Flags (Continued)

627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-ffast-math
-march=znver2
-mllvm -unroll-threshold=50
-acpu
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-lflang

Fortran benchmarks:

-ffast-math
-march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:

-ffast-math
-march=znver2
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -funroll-loops -Mrecursive -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:

-std=c++98 -ffast-math
-march=znver2
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -funroll-loops -Mrecursive -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

(Continued on next page)
**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2`
- `-fstruct-layout=3 -mllvm -unroll-threshold=50 -fremap-arrays`
- `-mllvm -function-specialize -mllvm -enable-gvn-hoist`
- `-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp`
- `-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000`
- `-flv-function-specialization -mllvm -loop-unswitch-threshold=200000`
- `-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch`
- `-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only`
- `-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec`
- `-lamdlibm -ljemalloc -lflang`

**Base Other Flags**

C benchmarks:
- `-Wno-return-type`

Fortran benchmarks:
- `-Wno-return-type`

Benchmarks using both Fortran and C:
- `-Wno-return-type`

Benchmarks using Fortran, C, and C++:
- `-Wno-return-type`

**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`
Lenovo Global Technology
ThinkSystem SR655
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CPU2017 License: 9017
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SPECspeed®2017_fp_base = 136
SPECspeed®2017_fp_peak = 142

Test Date: May-2020
Hardware Availability: Jun-2020
Software Availability: Dec-2019

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
- -flto -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver2
- -mno-sse4a -fstruct-layout=5 -mlllvm -vectorize-memory-aggressively
- -mlllvm -function-specialize -mlllvm -enable-gvn-hoist
- -mlllvm -unroll-threshold=50 -fremap-arrays
- -mlllvm -vector-library=LIBMVEC -mlllvm -reduce-array-computations=3
- -mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000
- -flv-function-specialization -DSPEC_OPENMP -fopenmp -lmvec -lamdlibm
- -fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lflang

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: -flto -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-region-vectorize
- -Wl,-mlllvm -Wl,-vector-library=LIBMVEC
- -march=znver2 -funroll-loops -Mrecursive
- -mlllvm -vector-library=LIBMVEC -Kieee
- -fno-finite-math-only -DSPEC_OPENMP -fopenmp
- -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- -ljemalloc -lflang
654.roms_s: -flto -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-region-vectorize
- -Wl,-mlllvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlllvm -Wl,-reduce-array-computations=3
- -Wl,-mlllvm -Wl,-enable-X86-prefetching -O3 -march=znver2
- -funroll-loops -Mrecursive -mlllvm -vector-library=LIBMVEC
- -Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp
- -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
- -ljemalloc -lflang

Benchmarks using both Fortran and C:
621.wrf_s: basepeak = yes

(Continued on next page)
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Peak Optimization Flags (Continued)

627.cam4_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-sl9 -mllvm -inline-threshold=1000
-fly-function-specialization -O3 -funroll-loops
-Mrecursive -Klee -fno-finite-math-only -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamdlibm -ljemalloc -lflang

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

Peak Other Flags

C benchmarks:
- -Wno-return-type

Fortran benchmarks:
- -Wno-return-type

Benchmarks using both Fortran and C:
- -Wno-return-type

Benchmarks using Fortran, C, and C++:
- -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-Rome-E.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-Rome-E.xml
Lenovo Global Technology

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Tested with SPEC CPU®2017 v1.1.0 on 2020-05-02 11:14:34-0400.