Lenovo Global Technology
ThinkSystem SR645
2.30 GHz, AMD EPYC 7642

| SPECspeed®2017_fp_base = 188 |
| SPECspeed®2017_fp_peak = 190 |

| Threads | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 |
|---------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 607.cactuBSSN_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 619.lbm_s | 96 | 61.5 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 621.wrf_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 627.cam4_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 628.pop2_s | 96 | 68.6 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 638.imagick_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 644.nab_s | 192 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 649.fotonik3d_s | 96 | 99.2 |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 654.roms_s | 96 |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

**SPECspeed®2017_fp_base** (188) --- **SPECspeed®2017_fp_peak** (190)

### Hardware

- **CPU Name:** AMD EPYC 7642
- **Max MHz:** 3300
- **Nominal:** 2300
- **Enabled:** 96 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, 16 MB shared / 3 cores
- **Other:** None
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP5 (x86_64) Kernel 4.12.14-120-default
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version D8E105P 1.00 released May-2020
- **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 prefer performance at the cost of additional power usage
Lenovo Global Technology

ThinkSystem SR645
2.30 GHz, AMD EPYC 7642

SPEC®2017 Floating Point Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

SGCN License: 9017
Test Date: Jun-2020
Test Sponsor: Lenovo Global Technology
Hardware Availability: Jun-2020
Tested by: Lenovo Global Technology
Software Availability: Dec-2019

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>94.7 623</td>
<td>94.7 623</td>
<td>94.9 622</td>
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<td>55.3 301</td>
<td>55.4 301</td>
<td>55.1 303</td>
<td>54.8 304</td>
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<tr>
<td>619.lbm_s</td>
<td>96</td>
<td>85.1 61.6</td>
<td>85.3 61.4</td>
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<td>96</td>
<td>101 131</td>
<td>99.7 133</td>
<td>100 132</td>
<td>99.7 133</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>96</td>
<td>69.2 128</td>
<td>69.0 128</td>
<td>68.5 129</td>
<td>69.0 129</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>96</td>
<td>188 63.1</td>
<td>173 68.6</td>
<td>173 68.8</td>
<td>173 68.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>96</td>
<td>46.2 312</td>
<td>46.5 310</td>
<td>46.0 314</td>
<td>46.5 310</td>
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<tr>
<td>644.nab_s</td>
<td>96</td>
<td>41.5 421</td>
<td>41.5 421</td>
<td>41.5 421</td>
<td>38.6 453</td>
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<td>649.fotonik3d_s</td>
<td>96</td>
<td>91.6 99.5</td>
<td>92.5 98.6</td>
<td>91.9 99.2</td>
<td>92.5 98.6</td>
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<tr>
<td>654.roms_s</td>
<td>96</td>
<td>49.9 316</td>
<td>50.0 315</td>
<td>50.0 315</td>
<td>49.6 317</td>
</tr>
</tbody>
</table>

Compilers 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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SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

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

Test Date: Jun-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 = "0-191"
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 = "192"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-95"

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) 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 v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
jemalloc 5.1.0 is available here:
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ThinkSystem SR645
2.30 GHz, AMD EPYC 7642

SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

General Notes (Continued)

https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS settings:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA nodes per socket set to NPS2
SOC P-States set to P0
Global C-state Control set to Disable

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C3/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1b6e66a485a0011
running on linux-d9uk Sun Jun 21 03:35:43 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 7642 48-Core Processor
  2 "physical id"s (chips)
  192 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 48
siblings : 96
physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
  32 33 34 36 37 38 40 41 42 44 45 46 48 49 50 52 53 54 56 57 58 60 61 62
physical 1: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
  32 33 34 36 37 38 40 41 42 44 45 46 48 49 50 52 53 54 56 57 58 60 61 62

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): 192
On-line CPU(s) list: 0-191
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49

(Continued on next page)
Lenovo Global Technology
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</table>

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

Platform Notes (Continued)

Model name: AMD EPYC 7642 48-Core Processor
Stepping: 0
CPU MHz: 2300.000
CPU max MHz: 2300.0000
CPU min MHz: 1500.0000
BogoMIPS: 4591.24
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-23,96-119
NUMA node1 CPU(s): 24-47,120-143
NUMA node2 CPU(s): 48-71,144-167
NUMA node3 CPU(s): 72-95,168-191
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

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

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 96 97 98 99
100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
node 0 size: 257843 MB
node 0 free: 257250 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141
142 143
node 1 size: 258024 MB
node 1 free: 257482 MB
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165
166 167
node 2 size: 258036 MB

(Continued on next page)
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SPECspeed\textsuperscript{\textregistered}2017\textsubscript{fp} peak = 190
SPECspeed\textsuperscript{\textregistered}2017\textsubscript{fp} base = 188

Platform Notes (Continued)

node 2 free: 257680 MB
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
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 3 size: 258005 MB
node 3 free: 257644 MB
node distances:
node 0 1 2 3
0: 10 12 32 32
1: 12 10 32 32
2: 32 32 10 12
3: 32 32 12 10

From /proc/meminfo
MemTotal: 1056677588 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 5
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP5"
VERSION_ID="12.5"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP5"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp5"

uname -a:
Linux linux-d9uk 4.12.14-120-default #1 SMP Thu Nov 7 16:39:09 UTC 2019 (fd9dc36)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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
Lenovo Global Technology
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SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

Platform Notes (Continued)

pointer sanitization
CVE-2017-5715 (Spectre variant 2):
  Mitigation: Full AMD retpoline, IBBP:
  conditional, IBRS_FW, STIBP: conditional, RSB
  filling
  tsx_async_abort:
  Not affected
run-level 3 Jun 21 03:32
SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 889G 82G 808G 10% /

From /sys/devices/virtual/dmi/id
  BIOS: Lenovo D8E105P-1.00 05/08/2020
  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:
  32x Samsung M393A4G43AB3-CWE 32 kB 2 rank 3200

(End of data from sysinfo program)
This system support 16 DIMMs per processor, total 32 DIMMs.
32 DIMM slots installed with 32 GB DIMM for this run.

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)

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## Lenovo Global Technology

**ThinkSystem SR645**

**2.30 GHz, AMD EPYC 7642**

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- **CPU2017 License:** 9017
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- **Tested by:** Lenovo Global Technology
- **Test Date:** Jun-2020
- **Hardware Availability:** Jun-2020
- **Software Availability:** Dec-2019

### Compiler Version Notes (Continued)

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

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

---

#### Fortran

| 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |

---

#### Fortran, C

| 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_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

---

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
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### 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:**  
  - -flto  
  - -Wl,-mllvm -Wl,-function-specialize  
  - -Wl,-mllvm -Wl,-region-vectorize  
  - -Wl,-mllvm -Wl,-reduce-array-computations=3  
  - -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  
  - -fiv-function-specialization -z muldefs  
  - -DSPEC_OPENMP  
  - -fopenmp=libomp  
  - -lomp  
  - -lpthread  
  - -ldl  
  - -lmvec  
  - -lamdlibm  
  - -ljemalloc  
  - -lflang

- **Fortran benchmarks:**  
  - -flto  
  - -Wl,-mllvm -Wl,-function-specialize  
  - -Wl,-mllvm -Wl,-region-vectorize  
  - -Wl,-mllvm -Wl,-vector-library=LIBMVEC

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SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-Wl,-mlvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
-funroll-loops -Mrecursive -mlvm -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:
-fflto -Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-region-vectorize -Wl,-mlvm -Wl,-vector-library=LIBMVEC
-Wl,-mlvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mlvm -unroll-threshold=50
-fremap-arrays -mlvm -function-specialize -mlvm -enable-gvn-hoist
-mlvm -reduce-array-computations=3 -mlvm -global-vectorize-slp
-mlvm -vector-library=LIBMVEC -mlvm -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 -fflto -Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-region-vectorize -Wl,-mlvm -Wl,-vector-library=LIBMVEC
-Wl,-mlvm -Wl,-reduce-array-computations=3
-Wl,-mlvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-fstruct-layout=3 -mlvm -unroll-threshold=50 -fremap-arrays
-mlvm -function-specialize -mlvm -enable-gvn-hoist
-mlvm -reduce-array-computations=3 -mlvm -global-vectorize-slp
-mlvm -vector-library=LIBMVEC -mlvm -inline-threshold=1000
-flv-function-specialization -mlvm -loop-unswitch-threshold=200000
-mlvm -unroll-threshold=100 -mlvm -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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
2.30 GHz, AMD EPYC 7642

SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

Base Other Flags (Continued)

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

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: -fito -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-slp -mllvm -inline-threshold=1000

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

644.nab_s (continued):
- 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: basepeak = yes

654.roms_s: -flto -Wl,-mllvcm -Wl,-function-specialize
- Wl,-mllvcm -Wl,-region-vectorize
- Wl,-mllvcm -Wl,-vector-library=LIBMVEC
- Wl,-mllvcm -Wl,-reduce-array-computations=3
- Wl,-mllvcm -Wl,-enable-XX86-prefetching -O3 -march=znver2
- funroll-loops -Mrecursive -mllvcm -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

627.cam4_s: -flto -Wl,-mllvcm -Wl,-function-specialize
- Wl,-mllvcm -Wl,-region-vectorize
- Wl,-mllvcm -Wl,-vector-library=LIBMVEC
- Wl,-mllvcm -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-slp -mllvm -inline-threshold=1000
- flv-function-specialization -O3 -funroll-loops
- Mrecursive -Kieee -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++:
- std=c++98 -flto -Wl,-mllvcm -Wl,-function-specialize
- Wl,-mllvcm -Wl,-region-vectorize -Wl,-mllvcm -Wl,-vector-library=LIBMVEC

(Continued on next page)
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SPECspeed®2017_fp_base = 188
SPECspeed®2017_fp_peak = 190

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

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

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- W1, -ml(vm -W1, -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
- fly-function-specialization -mlllvm -unroll-threshold=100
- mlllvm -enable-partial-unswitch -mlllvm -loop-unswitch-threshold=200000
- O3 -funroll-loops -Mrecursive -Kieee -fn-zero-math-only
- DSPEC_OPENGL -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
- lamdllibm -ljmallocc -lflang

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-Rome2P-K.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-Rome2P-K.xml

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