Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

SPECspeed®2017_fp_base = 79.0
SPECspeed®2017_fp_peak = 82.1

Threads

| Benchmark | 0 | 15.0 | 30.0 | 45.0 | 60.0 | 75.0 | 90.0 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 |
|-----------|---|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 607.cactuBSSN_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 619.lbm_s | 16 | 36.2 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 621.wrf_s | 16 |     | 81.0 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 627.cam4_s | 16 |     |     | 42.1 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 628.pop2_s | 16 |     |     |     | 47.7 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 638.imagick_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 644.nab_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 649.fotonik3d_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 654.roms_s | 16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

**Hardware**

- **CPU Name:** AMD EPYC 7252
- **Max MHz:** 3200
- **Nominal:** 3100
- **Enabled:** 16 cores, 2 chips, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 512 KB I+D on chip per core
- **Cache L3:** 64 MB I+D on chip per chip, 16 MB shared / 2 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
3.10 GHz, AMD EPYC 7252

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

Results Table

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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>36.3</td>
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SPECspeed®2017_fp_base = 79.0
SPECspeed®2017_fp_peak = 82.1

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)
Lenovo Global Technology
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SPEC Speed®2017_fp_base = 79.0
SPEC Speed®2017_fp_peak = 82.1

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-31"
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"
MALLOCONF = "retain:True"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "32"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26
11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26
11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-15"

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.
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:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

SPECspeed®2017_fp_base = 79.0
SPECspeed®2017_fp_peak = 82.1

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

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
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 295195f888a3d7ed2b1e6e46a485a011
running on linux-d9uk Thu May 28 05:26:53 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 7252 8-Core Processor
  2 "physical id"s (chips)
  32 "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 : 8
siblings : 16
physical 0: cores 0 1 4 5 8 9 12 13
physical 1: cores 0 1 4 5 8 9 12 13

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): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7252 8-Core Processor
Stepping: 0
CPU MHz: 3100.000

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

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

SPECspeed®2017_fp_base = 79.0
SPECspeed®2017_fp_peak = 82.1

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

Platform Notes (Continued)

CPU max MHZ: 3100.0000
CPU min MHZ: 1500.0000
BogoMIPS: 6188.15
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 nop1 nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cxt6 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrnd lahf_lm
cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osuw ibs
skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx cpb cat_l3
cdp_l3 hw_pstate sme ssbd s6m ibrs ibpb stibp vmcall bm1 avx2 smep bmi2
cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsavevc xsavevc xsaveexcptr
wbnoinvd 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: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
  node 0 size: 515857 MB
  node 0 free: 515357 MB
  node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
  node 1 size: 516091 MB
  node 1 free: 515710 MB
  node distances:
    node 0 1
    0: 10 32
    1: 32 10

From /proc/meminfo
  MemTotal: 1056715252 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

SPECspeed®2017_fp_base = 79.0
SPECspeed®2017_fp_peak = 82.1

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

Platform Notes (Continued)

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 pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling
tsx_async_abort: Not affected

run-level 3 May 28 05:23

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 81G 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
Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

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

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:
32x Samsung M393A4G43AB3-CWE 32 kB 2 rank 3200

(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) 649.fotonik3d_s(base, peak)
| 654.roms_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
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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)   
==============================================================================
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins

(Continued on next page)
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| SPECspeed\textsuperscript{®2017}_fp_base = 79.0 |
| SPECspeed\textsuperscript{®2017}_fp_peak = 82.1 |

**Compiler Version Notes (Continued)**

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

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.ibm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

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

Base Portability Flags (Continued)

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:
-fflag -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-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
-fly-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-lflang

Fortran benchmarks:
-fflag -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -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:
-fflag -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-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
-fly-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 -fflag -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3

(Continued on next page)
**SPEC CPU®2017 Floating Point Speed Result**

**Lenovo Global Technology**

ThinkSystem SR645
3.10 GHz, AMD EPYC 7252

**SPECspeed®2017_fp_base = 79.0**

**SPECspeed®2017_fp_peak = 82.1**

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

Benchmarks using Fortran, C, and C++ (continued):
- `-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 SR645 3.10 GHz, AMD EPYC 7252

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### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

#### C benchmarks:

<table>
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<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>619.ibm_s</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>basepeak = yes</td>
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#### Fortran benchmarks:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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</thead>
</table>

| 649.fotonik3d_s | Same as 603.bwaves_s |


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Peak Optimization Flags (Continued)

654.roms_s (continued):
-ffunroll-loops -fMrecursive -mlilvm -Wl, -vector-library=LIBMVEC
-Kieee -fnofinite-math-only -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamlibm
-ljemalloc -lflang

Benchmarks using both Fortran and C:

621.wrf_s: -flto -Wl, -mlilvm -Wl, -function-specialize
-Wl, -mlilvm -Wl, -region-vectorize
-Wl, -mlilvm -Wl, -vector-library=LIBMVEC
-Wl, -mlilvm -Wl, -reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fsstruct-layout=5
-mlilvm -vectorize-memory-aggressively
-mlilvm -function-specialize -mlilvm -enable-gvn-hoist
-mlilvm -unroll-threshold=50 -fremap-arrays
-mlilvm -vector-library=LIBMVEC
-mlilvm -reduce-array-computations=3
-mlilvm -global-vectorize-slp -mlilvm -inline-threshold=1000
-fly-function-specialization -O3 -funroll-loops
-Mrecursive -Kieee -fnofinite-math-only -DSPEC_OPENMP
-fopenmp =fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamlibm -ljemalloc -lflang

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-return-type

Fortran benchmarks:
- Wno-return-type

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

(Continued on next page)
**Lenovo Global Technology**

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### Peak Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-Wno-return-type
```

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


You can also download the XML flags sources by saving the following links:


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