**Lenovo Global Technology**  
**ThinkSystem SR665**  
**2.20 GHz, AMD EPYC 7552**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>184</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_peak**

<table>
<thead>
<tr>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>186</td>
</tr>
</tbody>
</table>

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

---

### Hardware

<table>
<thead>
<tr>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.lbm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>603</td>
<td>607</td>
<td>619</td>
<td>621</td>
<td>627</td>
<td>628</td>
<td>638</td>
<td>644</td>
<td>649</td>
<td>654</td>
</tr>
<tr>
<td>96 threads</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
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<tr>
<td>SPECspeed®2017_fp_base (184)</td>
<td>SPECspeed®2017_fp_peak (186)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Software

| OS:          | SUSE Linux Enterprise Server 12 SP5 (x86_64)  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++/Fortran: Version 2.0.0 of AOCC</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version D8E105P 1.00 released May-2020</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library v5.1.0</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

---

**CPU Name:** AMD EPYC 7552  
**Max MHz:** 3300  
**Nominal:** 2200  
**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:** 192 MB I+D on chip per chip, 16 MB shared / 4 cores  
**Other:** None  
**Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)  
**Storage:** 1 x 960 GB SATA SSD  
**Other:** None
# SPEC CPU® 2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR665**

2.20 GHz, AMD EPYC 7552

---

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

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

---

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>96.1</td>
<td>602</td>
<td>97.6</td>
<td>605</td>
<td><strong>97.9</strong></td>
<td><strong>602</strong></td>
<td>96</td>
<td><strong>97.9</strong></td>
<td><strong>603</strong></td>
<td>97.5</td>
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<td>607.cactuBSSN_s</td>
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<td>300</td>
<td>56.4</td>
<td>295</td>
<td>96</td>
<td><strong>55.5</strong></td>
<td><strong>300</strong></td>
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<td>619.lbm_s</td>
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<td><strong>86.3</strong></td>
<td><strong>60.7</strong></td>
<td>86.2</td>
<td>60.8</td>
<td>86.4</td>
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<td>96</td>
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<td><strong>93.9</strong></td>
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<td>95.9</td>
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<td>69.1</td>
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<td>628.pop2_s</td>
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<td><strong>96.8</strong></td>
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<td>97.0</td>
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<td><strong>94.1</strong></td>
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<td>282</td>
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**SPECspeed**\(^{\text{®}}\)\(\text{2017\_fp\_base} = 184\)**  
**SPECspeed**\(^{\text{®}}\)\(\text{2017\_fp\_peak} = 186\)**

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>

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)
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 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-95"

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

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-95"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 96 1 97 2 98 3 99 4 100 5 101 6 102 7 103 8 104 9 105
  10 106 11 107 12 108 13 109 14 110 15 111 16 112 17 113 18 114 19 115 20
  116 21 117 22 118 23 119 24 120 25 121 26 122 27 123 28 124 29 125 30
  126 31 127 32 128 33 129 34 130 35 131 36 132 37 133 38 134 39 135 40
  136 41 137 42 138 43 139 44 140 45 141 46 142 47 143 48 144 49 145 50
  146 51 147 52 148 53 149 54 150 55 151 56 152 57 153 58 154 59 155 60
  156 60 157 62 158 63 159 64 160 65 161 66 162 67 163 68 164 69 165 70
  166 71 167 72 168 73 169 74 170 75 171 76 172 77 173 78 174 79 175 80
  176 80 177 82 178 83 179 84 180 85 181 86 182 87 183 88 184 89 185 90
  186 91 187 92 188 93 189 94 190 95 9191"

Environment variables set by runcpu during the 654.roms_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.
Lenovo Global Technology
ThinkSystem SR665
2.20 GHz, AMD EPYC 7552

SPECspeed®2017_fp_base = 184
SPECspeed®2017_fp_peak = 186

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

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

General Notes (Continued)
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.
njemalloc: 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:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
Global C-state Control set to Disable
NUMA nodes per socket set to NPS2
SOC P-States set to P0

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C3/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbb1e6e46a485a0011
running on linux-410h Fri Jul 10 18:09:16 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 7552 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 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 physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

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

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

Lenovo Global Technology
ThinkSystem SR665
2.20 GHz, AMD EPYC 7552

SPECspeed®2017_fp_base = 184
SPECspeed®2017_fp_peak = 186

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

Platform Notes (Continued)

Core(s) per socket: 48
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7552 48-Core Processor
Stepping: 0
CPU MHz: 2200.000
CPU max MHz: 2200.000
CPU min MHz: 1500.000
BogoMIPS: 4319.89
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 cmov pat pse36 clfsb mmx fxsr sse sse2 ht syscall nx smmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cx16 sse4_1 sse4_2 movebe 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 bpex bt perfctr_l2 mwaitx cpb cat_l3 cpd_l3 hw_pstate sme ssbd sev ibrs ibpb stibp svmcall fsgsbase bmi1 avx2 smep bmi2
cqm rdtd_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsaveopt xgetbv1 xsaves cqm_llc cqm_occup_l1c cqm_mbbm_total cqm_mbbm_local clzero irperf xsaverepr wbnoinvd
arat npt lbv lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassis ptsavefilter 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: 4 nodes (0-3)
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: 257844 MB
node 0 free: 257413 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

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR665
2.20 GHz, AMD EPYC 7552

SPEC\textsuperscript{2017} Floating Point Speed Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPEC\textsuperscript{speed\textsuperscript{2017}}\_fp\_base = 184
SPEC\textsuperscript{speed\textsuperscript{2017}}\_fp\_peak = 186

CPU\textsuperscript{2017} License: 9017
Test Sponsor: Lenovo Global Technology
Hardware Availability: Jun-2020
Tested by: Lenovo Global Technology
Software Availability: Dec-2019
Test Date: Jul-2020

Platform Notes (Continued)

node 1 size: 258025 MB
node 1 free: 257450 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: 258037 MB
node 2 free: 257713 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: 258006 MB
node 3 free: 257646 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: 1056679644 kB
MemFree: 257450 MB
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-4l0h 4.12.14-120-default #1 SMP Thu Nov 7 16:39:09 UTC 2019 (fd9dc36)
x86\_64 x86\_64 x86\_64

Kernel self-reported vulnerability status:

itlb\_multihit: Not affected

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECspeed®2017_fp_base = 184
SPECspeed®2017_fp_peak = 186

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

Platform Notes (Continued)

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, IBBP: conditional, IBRS_FW, STIBP: conditional, RSB filling
tsx_async_abort: Not affected

run-level 3 Jul 10 17:59

SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 893G 36G 858G 4% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo D8E105P-1.00 05/08/2020
Vendor: Lenovo
Product: ThinkSystem SR665 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 |

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 184
SPECspeed®2017_fp_peak = 186

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Jul-2020
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Compiler Version Notes (Continued)

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
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
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Fortran, C | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)

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

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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
### Lenovo Global Technology

**ThinkSystem SR665**  
2.20 GHz, AMD EPYC 7552  

<table>
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<th>Specification</th>
<th>Value</th>
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<td>186</td>
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<tr>
<td>SPECspeed(^{2017_fp_base})</td>
<td>184</td>
</tr>
</tbody>
</table>

---

**Compiler Version Notes (Continued)**

- 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`

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### Base Portability Flags

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

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### Base Optimization Flags

**C benchmarks:**
- `-flto -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`
- `-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp`

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

C benchmarks (continued):
- -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
- -Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
- -funroll-loops -Mrrecusive -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:
- -flto -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
- -flv-function-specialization -funroll-loops -Mrrecusive -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 -flto -Wl,-mllvm -Wl,-function-specialize
- -Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
- -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 -Mrrecusive -z muldefs -Kieee -fno-finite-math-only
- -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
- -lamdlibm -ljemalloc -lflang

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**Base Other Flags**

C benchmarks:
- -Wno-return-type

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(Continued on next page)
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SPECspeed®2017_fp_base = 184
SPECspeed®2017_fp_peak = 186

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

Base Other Flags (Continued)

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

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: -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

(Continued on next page)
644.nab_s (continued):
-mlir -vectorize-memory-aggressively
-mlir -function-specialize -mlir -enable-gvn-hoist
-mlir -unroll-threshold=50 -fremap-arrays
-mlir -vector-library=LIBMVEC
-mlir -reduce-array-computations=3
-mlir -global-vectorize-slp -mlir -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopenmp
-lmvec -lamdlibm -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: -flto -Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-region-vectorize
-Wl,-mlir -Wl,-vector-library=LIBMVEC
-Wl,-mlir -Wl,-reduce-array-computations=3 -O3
-march=znver2 -funroll-loops -Mrecursive
-mlir -vector-library=LIBMVEC -Kieee
-fno-finite-math-only -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: -flto -Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-region-vectorize
-Wl,-mlir -Wl,-vector-library=LIBMVEC
-Wl,-mlir -Wl,-reduce-array-computations=3
-Wl,-mlir -Wl,-enable-X86-prefetching -O3 -march=znver2
-funroll-loops -Mrecursive -mlir -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: -flto -Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-region-vectorize
-Wl,-mlir -Wl,-vector-library=LIBMVEC
-Wl,-mlir -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mlir -vectorize-memory-aggressively
-mlir -function-specialize -mlir -enable-gvn-hoist
-mlir -unroll-threshold=50 -fremap-arrays
-mlir -vector-library=LIBMVEC
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Peak Optimization Flags (Continued)

621.wrf_s (continued):
-mlir -reduce-array-computations=3
-mlir -global-vectorize-slp -mlir -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

627.cam4_s: Same as 621.wrf_s

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
-std=c++98 -fno-rtt -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
-flv-function-specialization -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch -mllvm -loop-unswitch-threshold=200000
-O3 -funroll-loops -Mrecursive -Kieee -fno-finite-math-only
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamdlibm -ljemalloc -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
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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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