Lenovo Global Technology
ThinkSystem SR665
2.40 GHz, AMD EPYC 7532

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 171</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak = 179</td>
</tr>
</tbody>
</table>

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2020
Hardware Availability: Jun-2020

Tested by: Lenovo Global Technology
Software Availability: Dec-2019

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 12 SP5 (x86_64) Kernel 4.12.14-120-default</td>
<td>CPU Name: AMD EPYC 7532 Max MHz: 3300 Nominal: 2400</td>
</tr>
<tr>
<td>Compiler: C/C++/Fortran: Version 2.0.0 of AOCC</td>
<td>Enabled: 64 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Parallel: Yes</td>
<td>Orderable: 1.2 chips</td>
</tr>
<tr>
<td>Firmware: Lenovo BIOS Version D8E105P 1.00 released May-2020</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>File System: xfs</td>
<td>L2: 512 KB I+D on chip per core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>L3: 256 MB I+D on chip per chip, 16 MB shared / 2 cores</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Other: None</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>Other: jemalloc: jemalloc memory allocator library v5.1.0</td>
<td></td>
</tr>
</tbody>
</table>

### SPEC CPU 2017 Floating Point Speed Result

<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>167</td>
<td>179</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>264</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>128</td>
<td>135</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>128</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>128</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>292</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>AMD EPYC 7532</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3300</td>
</tr>
<tr>
<td>Nominal</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled</td>
<td>64 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>256 MB I+D on chip per chip, 16 MB shared / 2 cores</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>
Lenovo Global Technology
ThinkSystem SR665
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SPECSpeed®2017_fp_base = 171
SPECSpeed®2017_fp_peak = 179

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th></th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Threads</td>
<td></td>
<td></td>
<td>Threads</td>
<td></td>
<td>Threads</td>
<td></td>
<td>Threads</td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>86.0</td>
<td>686</td>
<td>87.5</td>
<td>64</td>
<td>86.0</td>
<td>686</td>
<td>87.5</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>60.8</td>
<td>274</td>
<td>63.2</td>
<td>64</td>
<td>60.8</td>
<td>274</td>
<td>63.2</td>
<td>64.2</td>
<td>260</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>90.7</td>
<td>57.8</td>
<td>85.4</td>
<td>61.4</td>
<td>85.8</td>
<td>61.0</td>
<td>85.8</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>100</td>
<td>132</td>
<td>98.1</td>
<td>135</td>
<td>98.2</td>
<td>135</td>
<td>98.2</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>79.5</td>
<td>111</td>
<td>81.4</td>
<td>109</td>
<td>83.6</td>
<td>106</td>
<td>83.6</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>197</td>
<td>60.4</td>
<td>199</td>
<td>59.5</td>
<td>200</td>
<td>59.5</td>
<td>200</td>
<td>60.1</td>
<td>198</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>62.1</td>
<td>232</td>
<td>62.2</td>
<td>232</td>
<td>62.4</td>
<td>231</td>
<td>62.4</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>53.5</td>
<td>326</td>
<td>53.9</td>
<td>324</td>
<td>53.9</td>
<td>324</td>
<td>53.9</td>
<td>92.5</td>
<td>638</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>90.4</td>
<td>101</td>
<td>91.3</td>
<td>99.9</td>
<td>90.8</td>
<td>100</td>
<td>90.8</td>
<td>90.0</td>
<td>101</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>53.1</td>
<td>296</td>
<td>54.0</td>
<td>292</td>
<td>54.4</td>
<td>289</td>
<td>54.4</td>
<td>92.5</td>
<td>638</td>
</tr>
</tbody>
</table>

SPECSpeed®2017_fp_base = 171
SPECSpeed®2017_fp_peak = 179

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)
Lenovo Global Technology
ThinkSystem SR665
2.40 GHz, AMD EPYC 7532

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 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 627.cam4_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 628.pop2_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"
Lenovo Global Technology

ThinkSystem SR665
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
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<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**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:
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 Sat Jun 20 21:56:25 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 7532 32-Core Processor
   2 "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 : 32
siblings : 64
physical 0: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29 32 33 36 37 40 41 44 45
          48 49 52 53 56 57 60 61
physical 1: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29 32 33 36 37 40 41 44 45
          48 49 52 53 56 57 60 61
```

From lscpu:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
```

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 171
SPECspeed®2017_fp_peak = 179

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

Platform Notes (Continued)

Address sizes: 43 bits physical, 48 bits virtual
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7532 32-Core Processor
Stepping: 0
CPU MHz: 2400.000
CPU max MHz: 2400.0000
CPU min MHz: 1500.0000
BogoMIPS: 4790.91
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95
NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127
Flags: fpu vme de pse mce pmx pae mce csx8 pmx pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs
skinit wdt tce topoext perfctr_core perfctr_nb bpxext perfctr_l2 mwaitx cbp cat_l3
cdp_l3 hw_pstate sme ssbd sev ibrs i.bp stibp vmmcall fsgsbase bni1 avx2 smep bm12
cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaverptr wbinvd
arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist
pausefilter pfthreshold avic v_vmsave_vmload vgfl 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 64 65 66 67 68 69 70 71 72 73 74 75
  76 77 78 79
node 0 size: 257846 MB

(Continued on next page)
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SPECspeed®2017_fp_base = 171
SPECspeed®2017_fp_peak = 179

CPU2017 License: 9017
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Platform Notes (Continued)

node 0 free: 257549 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95
node 1 size: 258027 MB
node 1 free: 257816 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102
103 104 105 106 107 108 109 110 111
node 2 size: 258010 MB
node 2 free: 257678 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117
118 119 120 121 122 123 124 125 126 127
node 3 size: 258038 MB
node 3 free: 257696 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: 1056689672 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-410h 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:

(Continued on next page)
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Platform Notes (Continued)

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 Jun 20 21:36
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.ibm_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 |

(Continued on next page)
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Compiler Version Notes (Continued)

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

==============================================================================
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
Installed Dir: /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
Installed Dir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

==============================================================================
Fortran, C    | 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
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
Installed Dir: /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)

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
Installed Dir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR665
2.40 GHz, AMD EPYC 7532

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

Compiler Version Notes (Continued)

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.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:
-ffast-math
-march=znver2
-fflat-math

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 171
SPECspeed®2017_fp_peak = 179

Base Optimization Flags (Continued)

C benchmarks (continued):
- -flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
- -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 -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:
- -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 -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 -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 -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

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

ThinkSystem SR665
2.40 GHz, AMD EPYC 7532

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### 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: -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

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## Lenovo Global Technology

**ThinkSystem SR665**  
2.40 GHz, AMD EPYC 7532

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### Peak Optimization Flags (Continued)

619.lbm_s (continued):
- `-mllvm -unroll-threshold=50`  
- `-mllvm -vector-library=LIBMVEC`  
- `-mllvm -reduce-array-computations=3`  
- `-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000`  
- `-flv-function-specialization -DSPEC_OPENMP -fopenmp`  
- `-lmvec -lamdlibm -fopenmp=libomp -lomp -lpthread -ldl`  
- `-ljemalloc -lflang`

638.imagick_s: basepeak = yes

644.nab_s: Same as 619.lbm_s

### Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_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 -O3`  
- `-march=znver2 -funroll-loops -Mrecursive`  
- `-mllvm -vector-library=LIBMVEC -Kieee`  
- `-fno-finite-math-only -DSPEC_OPENMP -fopenmp`  
- `-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm`  
- `-ljemalloc -lflang`

654.roms_s: basepeak = yes

### 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 -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`

### Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes
Lenovo Global Technology

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SPECspeed®2017_fp_base = 171
SPECspeed®2017_fp_peak = 179

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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