Lenovo Global Technology
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

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

Threads

<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>331</td>
<td>335</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>219</td>
<td>227</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>31.1</td>
<td>31.1</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>66.4</td>
<td>66.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>214</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>61.5</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>141</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base (128) SPECspeed®2017_fp_peak (129)

Hardware
CPU Name: AMD EPYC 7702P
Max MHz: 3350
Nominal: 2000
Enabled: 64 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 512 KB I+D on chip per core
L3: 256 MB I+D on chip per chip, 16 MB shared / 4 cores
Other: None
Memory: 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++: Version 1.3.0 of AOCC
Fortran: Version 4.8.2 for GCC
Parallel: Yes
Firmware: Lenovo BIOS Version CFE103B released Jul-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc: jemalloc memory allocator library version 5.1.0
Power Management: --
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>178</td>
<td>332</td>
<td>178</td>
<td>331</td>
<td>179</td>
<td>330</td>
<td>64</td>
<td>178</td>
<td>332</td>
<td>178</td>
<td>331</td>
<td>179</td>
<td>330</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>76.3</td>
<td>219</td>
<td>76.3</td>
<td>219</td>
<td>75.9</td>
<td>220</td>
<td>64</td>
<td>73.7</td>
<td>226</td>
<td>73.3</td>
<td>227</td>
<td>73.4</td>
<td>227</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>168</td>
<td>31.1</td>
<td>168</td>
<td>31.1</td>
<td>168</td>
<td>31.1</td>
<td>64</td>
<td>168</td>
<td>31.1</td>
<td>168</td>
<td>31.1</td>
<td>168</td>
<td>31.1</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>87.4</td>
<td>151</td>
<td>86.9</td>
<td>152</td>
<td>86.8</td>
<td>152</td>
<td>64</td>
<td>87.4</td>
<td>151</td>
<td>86.9</td>
<td>152</td>
<td>86.8</td>
<td>152</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>87.2</td>
<td>102</td>
<td>86.7</td>
<td>102</td>
<td>87.0</td>
<td>102</td>
<td>64</td>
<td>87.2</td>
<td>102</td>
<td>86.7</td>
<td>102</td>
<td>87.0</td>
<td>102</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>178</td>
<td>66.6</td>
<td>179</td>
<td>66.2</td>
<td>179</td>
<td>66.4</td>
<td>64</td>
<td>177</td>
<td>67.0</td>
<td>179</td>
<td>66.4</td>
<td>178</td>
<td>66.6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>67.2</td>
<td>215</td>
<td>67.4</td>
<td>214</td>
<td>67.4</td>
<td>214</td>
<td>64</td>
<td>67.2</td>
<td>215</td>
<td>67.4</td>
<td>214</td>
<td>67.4</td>
<td>214</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>61.4</td>
<td>284</td>
<td>61.5</td>
<td>284</td>
<td>61.6</td>
<td>284</td>
<td>64</td>
<td>61.4</td>
<td>284</td>
<td>61.5</td>
<td>284</td>
<td>61.6</td>
<td>284</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>148</td>
<td>61.5</td>
<td>148</td>
<td>61.5</td>
<td>148</td>
<td>61.7</td>
<td>64</td>
<td>148</td>
<td>61.5</td>
<td>148</td>
<td>61.5</td>
<td>148</td>
<td>61.7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>112</td>
<td>141</td>
<td>112</td>
<td>141</td>
<td>112</td>
<td>141</td>
<td>64</td>
<td>112</td>
<td>141</td>
<td>112</td>
<td>141</td>
<td>112</td>
<td>141</td>
</tr>
</tbody>
</table>

**Compiler Notes**


The AOCC Fortran Plugin version 1.3.0 was used to leverage AOCC optimizers with gfortran. It is available here: [http://developer.amd.com/amd-aocc/](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

runspec command invoked through numactl i.e.:

```
numactl --interleave=all runspec <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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

Operating System Notes (Continued)

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)

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "~/home/cpu2017-1.0.5-amd-na/amd_speed_aocc130_naples_A_lib/64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-amd-na/amd_speed_aocc130_naples_A_lib/32"
OMP_DYNAMIC = "false"
OMP_PLACES = "cores"
OMP_PROC_BIND = "close"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "192M"
OMP_WAIT_POLICY = "active"

Binaries were compiled on a system with 2p AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.6

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 v4.8.5 in RHEL v7.2 under default conditions.
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS settings:
Operating Mode set to Maximum Performance
SMT Mode set to Disabled
EfficiencyModeEn set to Auto
Sysinfo program /home/cpu2017-1.0.5-amd-na/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d6f64985e45859ea9
running on linux-vapu Thu Feb 14 22:27:37 2019

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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

**SPECspeed®2017_fp_base = 128**

**SPECspeed®2017_fp_peak = 129**

---

**Platform Notes (Continued)**

From `/proc/cpuinfo`

- model name: AMD EPYC 7702P 64-Core Processor
- 1 "physical id"s (chips)
- 64 "processors"

- cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from `/proc/cpuinfo` might not be reliable. Use with caution.)
- cpu cores: 64
- siblings: 64
- physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

From `lscpu`:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 43 bits physical, 48 bits virtual
- CPU(s): 64
- On-line CPU(s) list: 0-63
- Thread(s) per core: 1
- Core(s) per socket: 64
- Socket(s): 1
- NUMA node(s): 1
- Vendor ID: AuthenticAMD
- CPU family: 23
- Model: 49
- Model name: AMD EPYC 7702P 64-Core Processor
- Stepping: 0
- CPU MHz: 2000.000
- CPU max MHz: 2000.0000
- CPU min MHz: 1500.0000
- BogoMIPS: 3992.46
- Virtualization: AMD-V
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 512K
- L3 cache: 16384K
- NUMA node0 CPU(s): 0-63

**Flags:**

- fpu vme de pse tsc msr pae mce cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor sse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy svmshadow abm sse4a misalignsse 3dnowprefetch osvw ibr skinit wdt tce topoext perfctr_core perfctr_nb bpxext perfctr_l2 mwaitx cpb cat_l13 cdp_l13 hw_pstate sme ssbd sev ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 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 xsaveopt arat npt

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

Copyright 2017-2019 Standard Performance Evaluation Corporation

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

Test Date: Feb-2019
Hardware Availability: Aug-2019
Software Availability: Jun-2019

Platform Notes (Continued)

lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave vmload vgif umip rdpid overflow_recov succor smca

/proc/cpuinfo cache data
  cache size : 512 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
    node 0 size: 257757 MB
    node 0 free: 256930 MB
    node distances:
      node 0
      0: 10

From /proc/meminfo
  MemTotal: 263944044 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

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

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

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling

run-level 3 Feb 14 22:21

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Feb-2019
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2019
Software Availability: Jun-2019

Platform Notes (Continued)

SPEC is set to: /home/cpu2017-1.0.5-amd-na
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sdb2      xfs   893G   39G  855G   5% /

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.
   BIOS Lenovo CFE103B 07/11/2019
   Memory:
      8x Samsung M393A4K40DB2-CWE 32 kB 2 rank 3200
      8x Unknown Unknown

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
   AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin
------------------------------------------------------------------------------
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
   AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin
AOCC.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
   AOCC_1_3_0_Release-Build#34) (based on LLVM AOCC.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aocc1.3.0/AOCC-1.3.0-Compiler/bin
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>129</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Feb-2019  
**Hardware Availability:** Aug-2019  
**Software Availability:** Jun-2019

### Compiler Version Notes (Continued)

For more information about these matters, see the file named COPYING

```bash
==============================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
------------------------------------------------------------------------------
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
==============================================================================
==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
------------------------------------------------------------------------------
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
AOCCLLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins  
AOCCLLVM.1.3.0.Release-Build#34) (based on LLVM AOCCLLVM.1.3.0.B34.2018_10_22)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /root/work/compilers/aoccl1.3.0/AOCC-1.3.0-Compiler/bin
```

### Base Compiler Invocation

C benchmarks:
- `clang`

Fortran benchmarks:
- `clang gfortran`

Benchmarks using both Fortran and C:
- `clang gfortran`

Benchmarks using Fortran, C, and C++:
- `clang++ clang gfortran`
Lenovo Global Technology

ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

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

Test Date: Feb-2019
Hardware Availability: Aug-2019
Software Availability: Jun-2019

---

**Base Portability Flags**

- `603.bwaves_s`: `-DSPEC_LP64`
- `607.cactuBSSN_s`: `-DSPEC_LP64`
- `619.lbm_s`: `-DSPEC_LP64`
- `621.wrf_s`: `-DSPEC_CASE_FLAG -fconvert=big-endian -DSPEC_LP64`
- `627.cam4_s`: `-DSPEC_CASE_FLAG -DSPEC_LP64`
- `628.pop2_s`: `-DSPEC_CASE_FLAG -fconvert=big-endian -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,-plugin-opt=-merge-constant`
- `-Wl,-plugin-opt=-lredundant-nested-loop`
- `-Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math`
- `-march=znver1 -mno-avx2 -fstructure-layout=3 -mllvm -unroll-threshold=50`
- `-fremap-arrays -mllvm -inline-threshold=1000`
- `-flv-function-specialization -mllvm -enable-gvn-hoist`
- `-mllvm -function-specialize -z muldefs -DSPEC_OPENMP -fopenmp`
- `-DSPEC_OPENMP -fopenmp=libomp -lomp -liphthread -ldl -ljemalloc`
- `-lamdlibm`

**Fortran benchmarks:**

- `-fLTO -Wl,-plugin-opt=-merge-constant`
- `-Wl,-plugin-opt=-lredundant-nested-loop`
- `-Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -mavx -madx`
- `-funroll-loops -ffast-math -z muldefs -fplugin=dragonegg.so`
- `-fplugin-arg-dragonegg-llvm-option=-merge-constant`
- `-fplugin-arg-dragonegg-llvm-option=-enable-vectorize-compares:false`
- `-DSPEC_OPENMP -DUSE_OPENMP -fopenmp -fopenmp=libomp -lomp -liphthread`
- `-ldl -ljemalloc -lamdlibm -lgfortran`

**Benchmarks using both Fortran and C:**

- `-fLTO -Wl,-plugin-opt=-merge-constant`
- `-Wl,-plugin-opt=-lredundant-nested-loop`
- `-Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math`
- `-march=znver1 -mno-avx2 -fstructure-layout=3 -mllvm -unroll-threshold=50`
- `-fremap-arrays -mllvm -inline-threshold=1000`
- `-flv-function-specialization -mllvm -enable-gvn-hoist`
- `-mllvm -function-specialize -mavx -madx -funroll-loops -z muldefs`
- `-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option=-merge-constant`
- `-fplugin-arg-dragonegg-llvm-option=-enable-vectorize-compares:false`

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

**Lenovo Global Technology**
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

**SPECspeed®2017_fp_base = 128**
**SPECspeed®2017_fp_peak = 129**

**CPU2017 License:** 9017
**Test Date:** Feb-2019
**Test Sponsor:** Lenovo Global Technology
**Hardware Availability:** Aug-2019
**Tested by:** Lenovo Global Technology
**Software Availability:** Jun-2019

### Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-DSPEC_OPENMP -DUSE_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread
-ldl -ljemalloc -lamdlibm -lgfortran

Benchmarks using Fortran, C, and C++:
-std=c++98 -flto -Wl, -plugin-opt=-merge-constant
-Wl, -plugin-opt=-lsr-in-nested-loop
-Wl, -plugin-opt=-enable-vectorize-compares=false -O3 -ffast-math
-march=znver1 -mno-avx2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -inline-threshold=1000
-fly-function-specialization -mllvm -enable-gvn-hoist
-mllvm -function-specialize -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -enable-vectorize-compares=false -mavx
-max -fremap-arrays -z muldefs -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=-merge-constant
-fplugin-arg-dragonegg-llvm-option=-enable-vectorize-compares=false
-DSPEC_OPENMP -fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread
-ldl -ljemalloc -lamdlibm

### 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:
clang gfortran

(Continued on next page)
### Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
```
c clang gfortran
```

Benchmarks using Fortran, C, and C++:
```
c clang++ clang gfortran
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:
```
619.lbm_s: -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lrs-in-nested-loop -Ofast -march=znver1
-fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -mllvm -unroll-threshold=100 -fremap-arrays
-mllvm -inline-threshold=1000 -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lamdlibm
```
```
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes
```

Fortran benchmarks:
```
603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes
```

Benchmarks using both Fortran and C:
```
621.wrf_s: basepeak = yes
627.cam4_s: basepeak = yes
```
```
628.pop2_s: -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lrs-in-nested-loop -Ofast -march=znver1
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR635
2.00 GHz, AMD EPYC 7702P

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 129

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Feb-2019
Tested by: Lenovo Global Technology
Hardware Availability: Aug-2019
Software Availability: Jun-2019

Peak Optimization Flags (Continued)

628.pop2_s (continued):
-ffstruct-layout=3 -mlirvm -vectorize-memory-aggressively
-features-avx2 -mlirvm -unroll-threshold=100 -fremap-arrays
-mlirvm -inline-threshold=1000 -O3 -mavx2 -madx
-funroll-loops -ffast-math -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvms-option=-merge-constant
-fplugin-arg-dragonegg-llvm-option=-inline-threshold:1000
-DSPEC_OPENMP -DUSE_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -ljemalloc -lamdlibm -lgfortran

Benchmarks using Fortran, C, and C++:
-std=c++98 -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -Ofast -march=znver1
-ffstruct-layout=3 -mlirvm -vectorize-memory-aggressively -mno-avx2
-mlirvm -unroll-threshold=100 -fremap-arrays
-mlirvm -inline-threshold=1000 -finline-aggressive -O3 -mavx2 -madx
-funroll-loops -ffast-math -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvms-option=-merge-constant
-fplugin-arg-dragonegg-llvm-option=-inline-threshold:1000 -DSPEC_OPENMP
-fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lamdlibm

Peak Other Flags

C benchmarks:
- Wno-return-type

Fortran benchmarks:
- Wno-return-type

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome-C.html
### Lenovo Global Technology

**ThinkSystem SR635**  
2.00 GHz, AMD EPYC 7702P

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>129</td>
</tr>
</tbody>
</table>

---

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

Test Date: Feb-2019  
Hardware Availability: Aug-2019  
Software Availability: Jun-2019

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

- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome-C.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome-C.xml)

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.0.5 on 2019-02-14 09:27:37-0500.  