## SPEC CPU®2017 Floating Point Speed Result

Epsylon Sp. z o.o. Sp. Komandytowa

Eterio 217 RZ1 (AMD Epyc 7402, 2.8 GHz)

AMD EPYC 7402

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>141</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>145</td>
</tr>
</tbody>
</table>

**Copyright 2017-2020 Standard Performance Evaluation Corporation**

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>AMD EPYC 7402</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3350</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2800</td>
</tr>
<tr>
<td>Enabled:</td>
<td>48 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>128 MB I+D on chip per chip, 16 MB shared / 3 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>512 GB (16 x 32 GB 2Rx4 PC4-3200V-L)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 960 GB SSD SATA III</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>CentOS Linux 8.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>kernel version:</td>
<td>4.18.0-193.19.1.el8_2.x86_64</td>
</tr>
<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>Version 3003 released Jul-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 and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9081

**Test Date:** Oct-2020

**Test Sponsor:** Epsylon Sp. z o.o. Sp. Komandytowa

**Hardware Availability:** Aug-2019

**Tested by:** Epsylon Sp. z o.o. Sp. Komandytowa

**Software Availability:** Sep-2020

**Tested by:** Epsylon Sp. z o.o. Sp. Komandytowa

**Test Sponsor:** Epsylon Sp. z o.o. Sp. Komandytowa

**Threads**

<table>
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<tr>
<th>Benchmark</th>
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<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>233</td>
<td>141</td>
</tr>
<tr>
<td>607.cactus_s</td>
<td>48</td>
<td>233</td>
<td>141</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>117</td>
<td>141</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>96</td>
<td>123</td>
<td>141</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>88.1</td>
<td>141</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>49.8</td>
<td>141</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>198</td>
<td>141</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>96</td>
<td>274</td>
<td>141</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
<td>91.7</td>
<td>141</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>48</td>
<td>193</td>
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**Software**

- **OS:** CentOS Linux 8.2
- **kernel version:** 4.18.0-193.19.1.el8_2.x86_64
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 3003 released Jul-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 and OS set to prefer performance at the cost of additional power usage
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Epsylon Sp. z o.o. Sp. Komandytowa
eterio 217 RZ1 (AMD Epyc 7402, 2.8 GHz)
AMD EPYC 7402

**SPECspeed®2017_fp_base = 141**

**SPECspeed®2017_fp_peak = 145**

<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>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>117</td>
<td>504</td>
<td>117</td>
<td>504</td>
<td>117</td>
<td>504</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>71.6</td>
<td>233</td>
<td>71.5</td>
<td>233</td>
<td>71.3</td>
<td>234</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>98.0</td>
<td>53.5</td>
<td>97.8</td>
<td>53.5</td>
<td>98.5</td>
<td>53.2</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>114</td>
<td>116</td>
<td>113</td>
<td>117</td>
<td>113</td>
<td>117</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>101</td>
<td>87.8</td>
<td>101</td>
<td>88.0</td>
<td>101</td>
<td>87.7</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>239</td>
<td>49.8</td>
<td>239</td>
<td>49.7</td>
<td>239</td>
<td>49.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
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<td>72.9</td>
<td>198</td>
<td>73.3</td>
<td>197</td>
<td>72.4</td>
<td>199</td>
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<tr>
<td>644.nab_s</td>
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<td>274</td>
<td>63.8</td>
<td>274</td>
<td>63.9</td>
<td>273</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
<td>100</td>
<td>90.8</td>
<td>99.0</td>
<td>92.1</td>
<td>99.4</td>
<td>91.7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>48</td>
<td>81.8</td>
<td>193</td>
<td>81.6</td>
<td>193</td>
<td>81.7</td>
<td>193</td>
</tr>
</tbody>
</table>

**Results Table**

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 = "0-95"
LD_LIBRARY_PATH =
"/home/CPU2017-1.1.0/amd_speed_aocc200_rome_C_lib/64;/home/CPU2017-1.1.0
/amd_speed_aocc200_rome_C_lib/32;"
MALLOCONF = "retain:true"
OMP_DYNNOMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "96"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 48 1 49 2 50 3 51 4 52 5 53 6 54 7 55 8 56 9 57 10 58
11 59 12 60 13 61 14 62 15 63 16 64 17 65 18 66 19 67 20 68 21 69 22 70
23 71 24 72 25 73 26 74 27 75 28 76 29 77 30 78 31 79 32 80 33 81 34 82
35 83 36 84 37 85 38 86 39 87 40 88 41 89 42 90 43 91 44 92 45 93 46 94
47 95"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0 48 1 49 2 50 3 51 4 52 5 53 6 54 7 55 8 56 9 57 10 58
11 59 12 60 13 61 14 62 15 63 16 64 17 65 18 66 19 67 20 68 21 69 22 70
23 71 24 72 25 73 26 74 27 75 28 76 29 77 30 78 31 79 32 80 33 81 34 82
35 83 36 84 37 85 38 86 39 87 40 88 41 89 42 90 43 91 44 92 45 93 46 94
47 95"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 48 1 49 2 50 3 51 4 52 5 53 6 54 7 55 8 56 9 57 10 58
11 59 12 60 13 61 14 62 15 63 16 64 17 65 18 66 19 67 20 68 21 69 22 70
23 71 24 72 25 73 26 74 27 75 28 76 29 77 30 78 31 79 32 80 33 81 34 82
35 83 36 84 37 85 38 86 39 87 40 88 41 89 42 90 43 91 44 92 45 93 46 94
47 95"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-47"

(Continued on next page)
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eterio 217 RZ1 (AMD Epyc 7402, 2.8 GHz)
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SPECspeed®2017_fp_base = 141
SPECspeed®2017_fp_peak = 145

Environment Variables Notes (Continued)

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-47"

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:
Power phase shedding = Disabled
SVM Mode = Disabled
SR-IOV support = Disabled
DRAM Scrub time = Disabled
NUMA nodes per socket = NPS4
Determinism Slider = Power

Sysinfo program /home/CPU2017-1.1.0/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed6e6e46a485a0011
running on Zyxel Thu Oct 22 10:41:22 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 7402 24-Core Processor
            2 "physical id"s (chips)
            96 "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 : 24
siblings : 48

(Continued on next page)
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CPU2017 License: 9081
Test Sponsor: Epsylon Sp. z o.o. Sp. Komandytowa
Tested by: Epsylon Sp. z o.o. Sp. Komandytowa

Platform Notes (Continued)

physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
physical 1: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7402 24-Core Processor
Stepping: 0
CPU MHz: 2223.824
CPU max MHz: 2800.0000
CPU min MHz: 1500.0000
BogoMIPS: 5599.79
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-23,48-71
NUMA node1 CPU(s): 24-47,72-95
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
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 ibr
skinit wdt tce topoext perfctr_core perfctr_nb bext perfctr_llc mwaitx cpb cat_l3
cdp_l3 hw_pstate sme ssbd mba sev ibrs ibpb stibp vmmcall fsqsbase bmii avx2 smep
bmi2 cqm rdt_a rdseed adx clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveerptr wbnoinvd
arat npt lbv svm_lock nrip_save tsc_scale vmbc_clean flushbyasid decodeassis
pausefilter pfthreshold avic v_vmsave_vmload vgif umip rdpid overflow_recover succor
smca

/proc/cpuinfo cache data
cache size : 512 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
different physical chip.
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**Test Sponsor:** Epsylon Sp. z o.o. Sp. Komandytowa  
**Tested by:** Epsylon Sp. z o.o. Sp. Komandytowa  
**Test Date:** Oct-2020  
**Hardware Availability:** Aug-2019  
**Software Availability:** Sep-2020

---

**Platform Notes (Continued)**

available: 2 nodes (0-1)  
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 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71  
node 0 size: 257550 MB  
node 0 free: 256926 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 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95  
node 1 size: 258035 MB  
node 1 free: 257160 MB  
node distances:  
node 0 1  
0: 10 32  
1: 32 10

From `/proc/meminfo`
- MemTotal: 527959744 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`
- centos-release: CentOS Linux release 8.2.2004 (Core)  
- centos-release-upstream: Derived from Red Hat Enterprise Linux 8.2 (Source)  
- os-release:  
  - NAME="CentOS Linux"  
  - VERSION="8 (Core)"  
  - ID="centos"  
  - ID_LIKE="rhel fedora"  
  - VERSION_ID="8"  
  - PLATFORM_ID="platform:el8"  
  - PRETTY_NAME="CentOS Linux 8 (Core)"  
  - ANSI_COLOR="0;31"  
- redhat-release: CentOS Linux release 8.2.2004 (Core)  
- system-release: CentOS Linux release 8.2.2004 (Core)  
- system-release-cpe: cpe:/o:centos:centos:8

uname -a:
- Linux Zyxel 4.18.0-193.19.1.e18_2.x86_64 #1 SMP Mon Sep 14 14:37:00 UTC 2020 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-2017-5757 (Meltdown): Not affected  
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp

(Continued on next page)
Epsylon Sp. z o.o. Sp. Komandytowa

**Platform Notes (Continued)**

CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retropile, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling
srbds: Not affected
tsx_async_abort: Not affected

run-level 3 Jun 22 11:12

SPEC is set to: /home/CPU2017-1.1.0

Filesystem                Type  Size  Used Avail Use% Mounted on
/dev/mapper/cl_zyxel-home xfs   839G  9.7G  829G   2% /home

From /sys/devices/virtual/dmi/id
BIOS:    American Megatrends Inc. 3003 07/10/2020
Vendor:  ASUSTek COMPUTER INC.
Product: KNPP-D32-R Series
Product Family: Server
Serial:  System Serial Number

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:
16x Micron Technology 36ASF4G72PZ-3G2E2 32 kB 2 rank 3200
16x Unknown Unknown

(End of data from sysinfo program)

**Compiler Version Notes**

<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
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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) |

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

SPECspeed®2017_fp_base = 141
SPECspeed®2017_fp_peak = 145

CPU2017 License: 9081
Test Sponsor: Epsylon Sp. z o.o. Sp. Komandytowa
Tested by: Epsylon Sp. z o.o. Sp. Komandytowa
Test Date: Oct-2020
Hardware Availability: Aug-2019
Software Availability: Sep-2020

Compiler Version Notes (Continued)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
   AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
   AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
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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         | 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
InstalledDir: /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
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Target: x86_64-unknown-linux-gnu
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InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
Epsylon Sp. z o.o. Sp. Komandytowa
cterio 217 RZ1 (AMD Epyc 7402, 2.8 GHz)
AMD EPYC 7402

SPECspeed®2017_fp_base = 141
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Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-fflto -Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-region-vectorize -Wl,-mlvm -Wl,-vector-library=LIBMVEC
-Wl,-mlvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mlvm -unroll-threshold=50
-fremap-arrays -mlvm -function-specialize -mlvm -enable-gvn-hoist
-mlvm -reduce-array-computations=3 -mlvm -global-vectorize-slp
-mlvm -vector-library=LIBMVEC -mlvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-llflang

Fortran benchmarks:
-fflto -Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-region-vectorize -Wl,-mlvm -Wl,-vector-library=LIBMVEC

(Continued on next page)
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AMD EPYC 7402

SPEC

SPEC®CPU2017 Floating Point Speed Result
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Epsylon Sp. z o.o. Sp. Komandytowa

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Software Availability: Sep-2020

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -march=znver2
- funroll-loops -Mrecursive -mlllvm -vector-library=LIBMVEC -z muldefs
- Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
- lomp -lpthread -ldl -lmvec -lmllibm -ljemalloc -lflang

Benchmarks using both Fortran and C:
- flto -W1,-mlllvm -W1,-function-specialize
- W1,-mlllvm -W1,-region-vectorize -W1,-mlllvm -W1,-vector-library=LIBMVEC
- W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -ffast-math
- march=znver2 -fstruct-layout=3 -mlllvm -unroll-threshold=50
- fremap-arrays -mlllvm -function-specialize -mlllvm -enable-gvn-hoist
- mlllvm -reduce-array-computations=3 -mlllvm -global-vectorize-slp
- mlllvm -vector-library=LIBMVEC -mlllvm -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 -lmllibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:
- std=c++98 -flto -W1,-mlllvm -W1,-function-specialize
- W1,-mlllvm -W1,-region-vectorize -W1,-mlllvm -W1,-vector-library=LIBMVEC
- W1,-mlllvm -W1,-reduce-array-computations=3
- W1,-mlllvm -W1,-suppress-fmas -O3 -ffast-math -march=znver2
- fstruct-layout=3 -mlllvm -unroll-threshold=50 -fremap-arrays
- mlllvm -function-specialize -mlllvm -enable-gvn-hoist
- mlllvm -reduce-array-computations=3 -mlllvm -global-vectorize-slp
- mlllvm -vector-library=LIBMVEC -mlllvm -inline-threshold=1000
- flv-function-specialization -mlllvm -loop-unswitch-threshold=200000
- mlllvm -unroll-threshold=100 -mlllvm -enable-partial-unswitch
- funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
- lamdllibm -ljemalloc -lflang

Base Other Flags

C benchmarks:
- Wno-return-type

Fortran benchmarks:
- Wno-return-type

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

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

Epsilon Sp. z o.o. Sp. Komandytowa
eterio 217 RZ1 (AMD Epyc 7402, 2.8 GHz)
AMD EPYC 7402

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>141</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>145</td>
</tr>
</tbody>
</table>

CPU2017 License: 9081
Test Sponsor: Epsilon Sp. z o.o. Sp. Komandytowa
Tested by: Epsilon Sp. z o.o. Sp. Komandytowa
Test Date: Oct-2020
Hardware Availability: Aug-2019
Software Availability: Sep-2020

### Base Other Flags (Continued)

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

### Peak Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:
- -fllto -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver2
- -Wl,-mlllvm -Wl,-vector-library=LIBMVEC -mlllvm -reduce-array-computations=3
- -mlllvm -vector-library=LIBMVEC -mlllvm -reduce-array-computations=3
- -flv-function-specialization -DSPEC_OPENMP -fopenmp -lmvec -lamdlibm
- -fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lflang

Fortran benchmarks:
- 603.bwaves_s: -flto -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-region-vectorize
- -Wl,-mlllvm -Wl,-vector-library=LIBMVEC

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

603.bwaves_s (continued):
- 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

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_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
  -funroll-loops -Mrecursive -mllvm -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, -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

627.cam4_s: Same as 621.wrf_s

628.pop2_s: basepeak = yes

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 -Ofast -march=znver2

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Epsylon Sp. z o.o. Sp. Komandytowa

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SPECspeed®2017_fp_base = 141
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Test Date: Oct-2020
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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-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
-mllvm -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
-landlibm -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

The flags files that were used to format this result can be browsed at:
http://www.spec.org/cpu2017/flags/Epsylon_platform_amd_RZ1_rome.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Epsylon_platform_amd_RZ1_rome.xml

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