SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

GIGA-BYTE TECHNOLOGY CO., LTD

(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
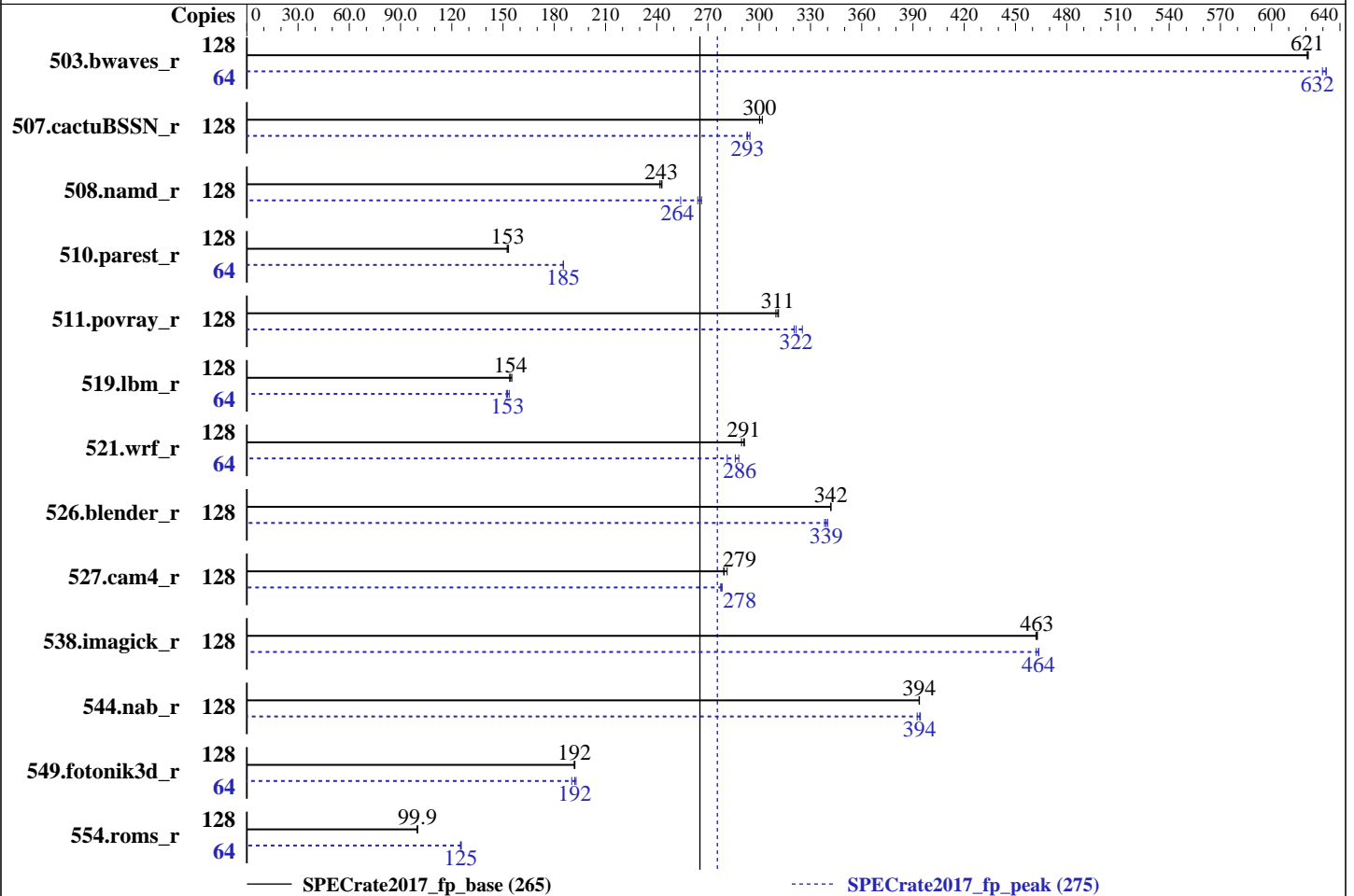**Test Sponsor:** GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Benchmark	Copies	Base	Peak
503.bwaves_r	128 / 64	621	632
507.cactuBSSN_r	128	300	293
508.namd_r	128	243	264
510.parest_r	128 / 64	153	185
511.povray_r	128	311	322
519.lbm_r	128 / 64	154	153
521.wrf_r	128 / 64	291	286
526.blender_r	128	342	339
527.cam4_r	128	279	278
538.imagick_r	128	463	464
544.nab_r	128	394	394
549.fotonik3d_r	128 / 64	192	192
554.roms_r	128 / 64	99.9	125

SPECrate2017_fp_base (265)
SPECrate2017_fp_peak (275)

Hardware

CPU Name: AMD EPYC 7601
 Max MHz.: 3200
 Nominal: 2200
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 64 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 64 MB I+D on chip per chip, 8 MB shared / 4 cores
 Other: None
Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2667V-L)

Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3 (x86_64)
 kernel 4.4.114-94.11-default

Compiler: C/C++: Version 1.0.0 of AOCC
 Fortran: Version 4.8.2 of GCC
Parallel: No
Firmware: Version F03 released Mar-2018
File System: xfs
System State: Run Level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc general purpose malloc implementation V4.5.0

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base =   265

SPECrate2017_fp_peak =   275

CPU2017 License: 4872	**Test Date:** Apr-2018
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.	**Hardware Availability:** Mar-2018
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.	**Software Availability:** Mar-2018

Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	2066	621	2068	621	**2067**	**621**	64	1016	632	**1016**	**632**	1019	630
507.cactuBSSN_r	128	537	302	**540**	**300**	540	300	128	550	295	**553**	**293**	553	293
508.namd_r	128	503	242	500	243	**501**	**243**	128	457	266	479	254	**461**	**264**
510.parest_r	128	2185	153	**2191**	**153**	2197	152	64	**903**	**185**	903	185	904	185
511.povray_r	128	965	310	**961**	**311**	960	311	128	933	320	919	325	**929**	**322**
519.lbm_r	128	877	154	**874**	**154**	870	155	64	**442**	**153**	439	154	444	152
521.wrf_r	128	990	290	984	291	**985**	**291**	64	510	281	**501**	**286**	498	288
526.blender_r	128	570	342	570	342	**570**	**342**	128	**575**	**339**	576	338	573	340
527.cam4_r	128	**801**	**279**	796	281	802	279	128	**806**	**278**	805	278	807	277
538.imagick_r	128	**688**	**463**	689	462	688	463	128	689	462	687	464	**687**	**464**
544.nab_r	128	547	394	**547**	**394**	547	394	128	546	394	549	392	**547**	**394**
549.fotonik3d_r	128	2601	192	2597	192	**2601**	**192**	64	1311	190	**1299**	**192**	1294	193
554.roms_r	128	**2037**	**99.9**	2036	99.9	2038	99.8	64	813	125	**812**	**125**	810	126
SPECrate2017_fp_base =	**265**											
SPECrate2017_fp_peak =	**275**											

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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

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 were enabled for this run (OS default)

Huge pages were not configured for this run.
```

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/amd/CPU2017/amd1704-rate-libs-revC/64;/home/amd/CPU2017/amd1704-rate-libs-revC/32:"
MALLOC_CONF = "lg_chunk:28"

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.4

jemalloc, a general purpose malloc implementation, was obtained at
https://github.com/jemalloc/jemalloc/releases/download/4.5.0/jemalloc-4.5.0.tar.bz2
jemalloc was built with GCC v4.8.5 in RHEL v7.2 under default conditions.
jemalloc uses environment variable MALLOC_CONF with values narenas and lg_chunk:
  narenas: sets the maximum number of arenas to use for automatic multiplexing
           of threads and arenas.
  lg_chunk: set the virtual memory chunk size (log base 2). For example,
            lg_chunk:21 sets the default chunk size to 2^21 = 2MiB.

The AOCC Gold Linker plugin was installed and used for the link stage.

The AOCC Fortran Plugin version 1.0 was used to leverage AOCC optimizers
with gfortran. It is available here:
http://developer.amd.com/amd-aocc/
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.
```

Platform Notes

```
BIOS Settings:
Determinism Slider = Power
cTDP Control = Manual
cTDP = 200
 Sysinfo program /home/amd/CPU2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-9o69 Thu Apr 12 21:31:29 2018

 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 7601 32-Core Processor
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Platform Notes (Continued)

```
     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 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
     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

  From lscpu:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     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):          8
     Vendor ID:             AuthenticAMD
     CPU family:            23
     Model:                 1
     Model name:            AMD EPYC 7601 32-Core Processor
     Stepping:              2
     CPU MHz:               2200.000
     CPU max MHz:           2200.0000
     CPU min MHz:           1200.0000
     BogoMIPS:              4400.04
     Virtualization:        AMD-V
     L1d cache:             32K
     L1i cache:             64K
     L2 cache:              512K
     L3 cache:              8192K
     NUMA node0 CPU(s):     0-7,64-71
     NUMA node1 CPU(s):     8-15,72-79
     NUMA node2 CPU(s):     16-23,80-87
     NUMA node3 CPU(s):     24-31,88-95
     NUMA node4 CPU(s):     32-39,96-103
     NUMA node5 CPU(s):     40-47,104-111
     NUMA node6 CPU(s):     48-55,112-119
     NUMA node7 CPU(s):     56-63,120-127
     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 extd_apicid amd_dcm aperfmperf eagerfpu pni
     pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD

(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872		**Test Date:**	Apr-2018
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.		**Hardware Availability:**	Mar-2018
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.		**Software Availability:**	Mar-2018

Platform Notes (Continued)

```
    rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
    osvw skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx arat cpb
    hw_pstate retpoline retpoline_amd npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
    flushbyasid decodeassists pausefilter pfthreshold vmmcall avic fsgsbase bmi1 avx2
    smep bmi2 rdseed adx smap clflushopt sha_ni xsaveopt xsavec xgetbv1 clzero irperf
    ibpb 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: 8 nodes (0-7)
   node 0 cpus: 0 1 2 3 4 5 6 7 64 65 66 67 68 69 70 71
   node 0 size: 128896 MB
   node 0 free: 128590 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 72 73 74 75 76 77 78 79
   node 1 size: 129021 MB
   node 1 free: 128795 MB
   node 2 cpus: 16 17 18 19 20 21 22 23 80 81 82 83 84 85 86 87
   node 2 size: 129021 MB
   node 2 free: 128783 MB
   node 3 cpus: 24 25 26 27 28 29 30 31 88 89 90 91 92 93 94 95
   node 3 size: 129021 MB
   node 3 free: 128793 MB
   node 4 cpus: 32 33 34 35 36 37 38 39 96 97 98 99 100 101 102 103
   node 4 size: 129021 MB
   node 4 free: 128771 MB
   node 5 cpus: 40 41 42 43 44 45 46 47 104 105 106 107 108 109 110 111
   node 5 size: 129021 MB
   node 5 free: 128776 MB
   node 6 cpus: 48 49 50 51 52 53 54 55 112 113 114 115 116 117 118 119
   node 6 size: 129021 MB
   node 6 free: 128776 MB
   node 7 cpus: 56 57 58 59 60 61 62 63 120 121 122 123 124 125 126 127
   node 7 size: 129020 MB
   node 7 free: 128783 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  16  16  16  32  32  32  32
     1:  16  10  16  16  32  32  32  32
     2:  16  16  10  16  32  32  32  32
     3:  16  16  16  10  32  32  32  32
     4:  32  32  32  32  10  16  16  16
     5:  32  32  32  32  16  10  16  16
     6:  32  32  32  32  16  16  10  16
     7:  32  32  32  32  16  16  16  10
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD

(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       1056812508 kB
   HugePages_Total:         0
   Hugepagesize:         2048 kB

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 3
      # 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-SP3"
      VERSION_ID="12.3"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
   Linux linux-9o69 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 12 10:21

SPEC is set to: /home/amd/CPU2017
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sdb4       xfs   852G  5.7G  847G   1% /home

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 GIGABYTE F03 03/12/2018
   Memory:
    16x Samsung M386A8K40BM2-CTD 64 GB 4 rank 2667
    16x Unknown Unknown

(End of data from sysinfo program)
```

GIGA-BYTE TECHNOLOGY CO., LTD

(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91

(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872

Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.

Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018

Hardware Availability: Mar-2018

Software Availability: Mar-2018

Compiler Version Notes

```
==============================================================================
  CC   519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
------------------------------------------------------------------------------


==============================================================================
  CXXC 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
------------------------------------------------------------------------------


==============================================================================
  CC   511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
------------------------------------------------------------------------------


==============================================================================
  FC   507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Compiler Version Notes (Continued)

```
InstalledDir: /root/work/compilers/AOCC-1.0-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.
For more information about these matters, see the file named COPYING
--------------------------------------------------------------------------


==========================================================================
  FC   503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(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
--------------------------------------------------------------------------


==========================================================================
  CC   521.wrf_r(base, peak) 527.cam4_r(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
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
  AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
--------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD

(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91

(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872

Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.

Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018

Hardware Availability: Mar-2018

Software Availability: Mar-2018

Base Compiler Invocation (Continued)

Fortran benchmarks:
```
clang gfortran
```

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

Benchmarks using both C and C++:
```
clang++ clang
```

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

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_CASE_FLAG -fconvert=big-endian -DSPEC_LP64`
526.blender_r: `-funsigned-char -D__BOOL_DEFINED -DSPEC_LP64`
527.cam4_r: `-DSPEC_CASE_FLAG -DSPEC_LP64`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3 -ffast-math -march=znver1 -fstruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
-inline-threshold=1000 -z muldefs -ljemalloc
```

C++ benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3 -march=znver1 -mllvm -unroll-threshold=100
-finline-aggressive -fremap-arrays -inline-threshold=1000 -z muldefs
-ljemalloc
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872		**Test Date:**	Apr-2018
Test Sponsor:	GIGA-BYTE TECHNOLOGY CO., LTD.	**Hardware Availability:**	Mar-2018
Tested by:	GIGA-BYTE TECHNOLOGY CO., LTD.	**Software Availability:**	Mar-2018

Base Optimization Flags (Continued)

Fortran benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3(gfortran) -O3(clang) -mavx -madx
-funroll-loops -ffast-math -z muldefs -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=" -disable-vect-cmp" -ljemalloc
-lgfortran  -lamdlibm
```

Benchmarks using both Fortran and C:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3(clang) -ffast-math -march=znver1
-fstruct-layout=2 -mllvm -unroll-threshold=100 -fremap-arrays
-mno-avx2 -inline-threshold=1000 -O3(gfortran) -mavx -madx
-funroll-loops -z muldefs -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=" -disable-vect-cmp" -ljemalloc
-lgfortran  -lamdlibm
```

Benchmarks using both C and C++:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3 -ffast-math -march=znver1 -fstruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
-inline-threshold=1000 -finline-aggressive -z muldefs -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3(clang) -ffast-math -march=znver1
-fstruct-layout=2 -mllvm -unroll-threshold=100 -fremap-arrays
-mno-avx2 -inline-threshold=1000 -finline-aggressive -O3(gfortran)
-mavx -madx -funroll-loops -z muldefs -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=" -disable-vect-cmp" -ljemalloc
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
clang gfortran
```

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

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.

Test Date: Apr-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Peak Compiler Invocation (Continued)

Benchmarks using both C and C++:
```
clang++ clang
```

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop -Ofast
-march=znver1 -fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -unroll-threshold=100 -fremap-arrays -inline-threshold=1000
-ljemalloc
```

C++ benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop -Ofast
-march=znver1 -finline-aggressive -mllvm -unroll-threshold=100
-fremap-arrays -inline-threshold=1000 -ljemalloc
```

Fortran benchmarks:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-O3(gfortran) -O3(clang) -mavx2 -madx -funroll-loops -ffast-math
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option="
-inline-threshold:1000" -ljemalloc -lgfortran  -lamdlibm
```

Benchmarks using both Fortran and C:

```
 521.wrf_r: -flto -Wl, -plugin-opt= -merge-constant
-lsr-in-nested-loop -O3(clang) -mavx -ffast-math
-O3(gfortran) -funroll-loops -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option="
-inline-threshold:1000" -ljemalloc -lgfortran  -lamdlibm
```

```
 527.cam4_r: -flto -Wl, -plugin-opt= -merge-constant
-lsr-in-nested-loop -Ofast -march=znver1
-fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -unroll-threshold=100 -fremap-arrays
-inline-threshold=1000 -O3(gfortran) -O3(clang) -mavx2
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

GIGA-BYTE TECHNOLOGY CO., LTD
(Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.)

R181-Z91
(AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_base = 265

SPECrate2017_fp_peak = 275

CPU2017 License: 4872   **Test Date:** Apr-2018
Test Sponsor: GIGA-BYTE TECHNOLOGY CO., LTD.   **Hardware Availability:** Mar-2018
Tested by: GIGA-BYTE TECHNOLOGY CO., LTD.   **Software Availability:** Mar-2018

Peak Optimization Flags (Continued)

527.cam4_r (continued):
```
-madx -funroll-loops -ffast-math -fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option="
-inline-threshold:1000" -ljemalloc -lgfortran  -lamdlibm
```

Benchmarks using both C and C++:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop -Ofast
-march=znver1 -fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -unroll-threshold=100 -fremap-arrays -inline-threshold=1000
-finline-aggressive -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop -Ofast
-march=znver1 -fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -unroll-threshold=100 -fremap-arrays -inline-threshold=1000
-finline-aggressive -O3 -mavx2 -madx -funroll-loops -ffast-math
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option="
-inline-threshold:1000" -ljemalloc
```

The flags files that were used to format this result can be browsed at
```
http://www.spec.org/cpu2017/flags/gcc.2018-02-16.html
http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.html
```

You can also download the XML flags sources by saving the following links:
```
http://www.spec.org/cpu2017/flags/gcc.2018-02-16.xml
http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.xml
```

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

Tested with SPEC CPU2017 v1.0.2 on 2018-04-12 09:31:28-0400.
Report generated on 2019-02-21 14:57:05 by CPU2017 PDF formatter v6067.
Originally published on 2018-05-16.