



SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_fp_base = 201

PowerEdge R7425 (AMD EPYC 7351, 2.40GHz)

SPECrate2017_fp_peak = 205

CPU2017 License: 55

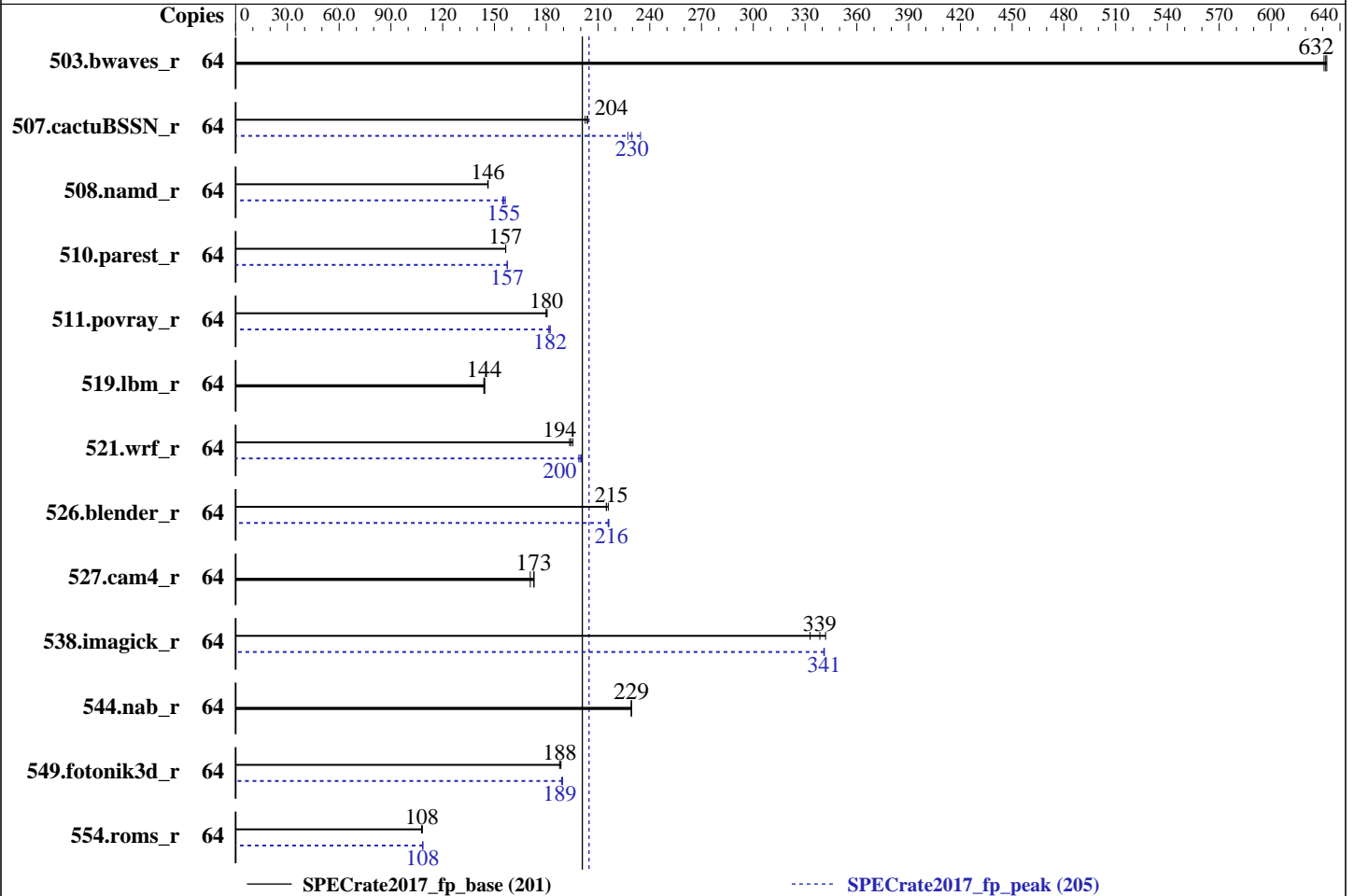
Test Date: Mar-2019

Test Sponsor: Dell Inc.

Hardware Availability: Jan-2019

Tested by: Dell Inc.

Software Availability: Feb-2019



Hardware

CPU Name: AMD EPYC 7351
 Max MHz.: 2900
 Nominal: 2400
 Enabled: 32 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 / 2 cores
 Other: None
 Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2666V-L)
 Storage: 1 x 120 GB SATA SSD
 Other: None

Software

OS: Ubuntu 18.04.2 LTS
 kernel 4.15.0-45-generic
 4.15.0-45-generic
 Compiler: C/C++: Version 1.3.0 of AOCC
 Fortran: Version 4.8.2 of GCC
 Parallel: No
 Firmware: Version 1.7.6 released Jan-2019
 File System: ext4
 System State: Run level 5 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: jemalloc: jemalloc memory allocator library
 V5.1.0



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	64	1016	632	1015	632	1017	631	64	1016	632	1015	632	1017	631
507.cactuBSSN_r	64	397	204	398	204	400	203	64	356	227	353	230	345	235
508.namd_r	64	416	146	415	146	416	146	64	389	156	393	155	391	155
510.parest_r	64	1070	157	1070	156	1069	157	64	1063	157	1063	157	1063	157
511.povray_r	64	828	181	830	180	831	180	64	820	182	820	182	823	181
519.lbm_r	64	467	144	469	144	468	144	64	467	144	469	144	468	144
521.wrf_r	64	741	194	733	195	738	194	64	715	200	718	200	721	199
526.blender_r	64	451	216	454	215	454	215	64	451	216	452	216	451	216
527.cam4_r	64	648	173	655	171	647	173	64	648	173	655	171	647	173
538.imagick_r	64	470	339	478	333	466	342	64	467	341	466	341	467	341
544.nab_r	64	470	229	470	229	470	229	64	470	229	470	229	470	229
549.fotonik3d_r	64	1328	188	1323	189	1326	188	64	1320	189	1316	189	1317	189
554.roms_r	64	944	108	942	108	940	108	64	938	108	937	109	939	108

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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/>

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

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/>

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>

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Operating System Notes (Continued)

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)

General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5/amd1812na_rate_revA_lib/64:/home/cpu2017-1.0.5/amd1812na_rate_revA_lib/32:"
```

Binaries were compiled on a system with 2 x 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.

jemalloc: configured and built with GCC v4.8.5 in RHEL v7.2 under default conditions.
jemalloc: sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>
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 2²¹ = 2MiB

Platform Notes

BIOS settings:

Determinism Slider set to Power Determinism

Sysinfo program /home/cpu2017-1.0.5/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on r7425 Thu Mar 7 00:53:53 2019

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Platform Notes (Continued)

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 7351 16-Core Processor

2 "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 : 16

siblings : 32

physical 0: cores 0 1 8 9 12 13 16 17 20 21 24 25 28 29

physical 1: cores 0 1 8 9 12 13 16 17 20 21 24 25 28 29

From lscpu:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 64

On-line CPU(s) list: 0-63

Thread(s) per core: 2

Core(s) per socket: 16

Socket(s): 2

NUMA node(s): 8

Vendor ID: AuthenticAMD

CPU family: 23

Model: 1

Model name: AMD EPYC 7351 16-Core Processor

Stepping: 2

CPU MHz: 2569.797

BogoMIPS: 4790.91

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 64K

L2 cache: 512K

L3 cache: 8192K

NUMA node0 CPU(s): 0,8,16,24,32,40,48,56

NUMA node1 CPU(s): 2,10,18,26,34,42,50,58

NUMA node2 CPU(s): 4,12,20,28,36,44,52,60

NUMA node3 CPU(s): 6,14,22,30,38,46,54,62

NUMA node4 CPU(s): 1,9,17,25,33,41,49,57

NUMA node5 CPU(s): 3,11,19,27,35,43,51,59

NUMA node6 CPU(s): 5,13,21,29,37,45,53,61

NUMA node7 CPU(s): 7,15,23,31,39,47,55,63

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

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Platform Notes (Continued)

```

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 amd_dcm aperfmperf pni
pclmulqdq monitor ssse3 fma cxl6 sse4_1 sse4_2 movbe popcnt aes xsave avx fl6c
rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw skinit wdt tce topoext perfctr_core perfctr_nb bpxt perfctr_llc mwaitx cpb
hw_pstate sme ssbd ibpb vmcall fsgsbase bmi1 avx2 smep bmi2 rdseed adx smap
clflushopt sha_ni xsaveopt xsavec xgetbv1 xsaves clzero irperf xsaveerptr arat npt
lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif 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 8 16 24 32 40 48 56
node 0 size: 128638 MB
node 0 free: 128427 MB
node 1 cpus: 2 10 18 26 34 42 50 58
node 1 size: 129020 MB
node 1 free: 128841 MB
node 2 cpus: 4 12 20 28 36 44 52 60
node 2 size: 129020 MB
node 2 free: 128785 MB
node 3 cpus: 6 14 22 30 38 46 54 62
node 3 size: 129020 MB
node 3 free: 128823 MB
node 4 cpus: 1 9 17 25 33 41 49 57
node 4 size: 129020 MB
node 4 free: 128863 MB
node 5 cpus: 3 11 19 27 35 43 51 59
node 5 size: 129020 MB
node 5 free: 128852 MB
node 6 cpus: 5 13 21 29 37 45 53 61
node 6 size: 128999 MB
node 6 free: 128836 MB
node 7 cpus: 7 15 23 31 39 47 55 63
node 7 size: 124986 MB
node 7 free: 124835 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

```

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Platform Notes (Continued)

```

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

```

From /proc/meminfo

```

MemTotal:      1052392344 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

```

```

/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS

```

From /etc/*release* /etc/*version*

```

debian_version: buster/sid
os-release:
  NAME="Ubuntu"
  VERSION="18.04.2 LTS (Bionic Beaver)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 18.04.2 LTS"
  VERSION_ID="18.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"

```

uname -a:

```

Linux r7425 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 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

```

run-level 5 Mar 6 15:21

SPEC is set to: /home/cpu2017-1.0.5

```

Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       ext4  109G   19G   85G  19% /

```

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 Dell Inc. 1.7.6 01/14/2019

Memory:

16x 80CE863280CE M386A8K40BM2-CTD 64 GB 4 rank 2666

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Platform Notes (Continued)

16x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

=====
CC 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(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/aoccl.3.0/AOCC-1.3.0-Compiler/bin

=====
CXXC 508.namd_r(base, peak) 510.parest_r(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/aoccl.3.0/AOCC-1.3.0-Compiler/bin

=====
CC 511.povray_r(base, peak) 526.blender_r(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/aoccl.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/aoccl.3.0/AOCC-1.3.0-Compiler/bin

=====
FC 507.cactuBSSN_r(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)

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 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/aoccl.3.0/AOCC-1.3.0-Compiler/bin
 GNU Fortran (GCC) 4.8.2
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 You may redistribute copies of GNU Fortran
 under the terms of the GNU General Public License.
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=====

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

GNU Fortran (GCC) 4.8.2
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=====

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.
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 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)
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Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

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
-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
```

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-flv-function-specialization -mllvm -enable-gvn-hoist  
-mllvm -function-specialize -z muldefs -lamdlibm -lpthread -ldl  
-ljemalloc
```

C++ benchmarks:

```
-std=c++98 -flto -Wl,-plugin-opt=-merge-constant  
-Wl,-plugin-opt=-lsr-in-nested-loop  
-Wl,-plugin-opt=-enable-vectorize-compares=false -O3 -march=znver1  
-mllvm -unroll-threshold=100 -finline-aggressive -fremap-arrays  
-mllvm -inline-threshold=1000 -mllvm -enable-vectorize-compares=false  
-z muldefs -lpthread -ldl -ljemalloc
```

Fortran benchmarks:

```
-flto -Wl,-plugin-opt=-merge-constant  
-Wl,-plugin-opt=-lsr-in-nested-loop  
-Wl,-plugin-opt=-enable-vectorize-compares=false -O3(gfortran)  
-O3(clang) -mavx -madox -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  
-lpthread -ldl -ljemalloc -lgfortran -lamdlibm
```

Benchmarks using both Fortran and C:

```
-flto -Wl,-plugin-opt=-merge-constant  
-Wl,-plugin-opt=-lsr-in-nested-loop  
-Wl,-plugin-opt=-enable-vectorize-compares=false -O3(clang) -ffast-math  
-march=znver1 -mno-avx2 -fstruct-layout=3 -mllvm -unroll-threshold=50  
-fremap-arrays -mllvm -inline-threshold=1000  
-flv-function-specialization -mllvm -enable-gvn-hoist  
-mllvm -function-specialize -O3(gfortran) -mavx -madox -funroll-loops  
-z muldefs -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=-merge-constant  
-fplugin-arg-dragonegg-llvm-option=-enable-vectorize-compares:false  
-lpthread -ldl -ljemalloc -lgfortran -lamdlibm
```

Benchmarks using both 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  
-flv-function-specialization -mllvm -enable-gvn-hoist  
-mllvm -function-specialize -mllvm -unroll-threshold=100  
-finline-aggressive -mllvm -enable-vectorize-compares=false -z muldefs  
-lpthread -ldl -ljemalloc
```

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Base Optimization Flags (Continued)

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(clang) -ffast-math
-march=znver1 -mno-avx2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-freemap-arrays -mllvm -inline-threshold=1000
-flv-function-specialization -mllvm -enable-gvn-hoist
-mllvm -function-specialize -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -enable-vectorize-compares=false
-O3(gfortran) -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
-lpthread -ldl -ljemalloc

```

Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

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

Peak Portability Flags

Same as Base Portability Flags



SPEC CPU2017 Floating Point Rate Result

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Dell Inc.

SPECrate2017_fp_base = 201

PowerEdge R7425 (AMD EPYC 7351, 2.40GHz)

SPECrate2017_fp_peak = 205

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Mar-2019

Hardware Availability: Jan-2019

Software Availability: Feb-2019

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

```
538.imagick_r: -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-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 -lpthread -ldl -ljemalloc
```

544.nab_r: basepeak = yes

C++ benchmarks:

```
-std=c++98 -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -Ofast -march=znver1
-finline-aggressive -mllvm -unroll-threshold=100 -fremap-arrays
-mllvm -inline-threshold=1000 -lpthread -ldl -ljemalloc
```

Fortran benchmarks:

503.bwaves_r: basepeak = yes

```
549.fotonik3d_r: -flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -O3(gfortran)
-O3(clang) -mavx2 -madx -funroll-loops -ffast-math
-fplugin=dragonegg.so
-fplugin-arg-dragonegg-llvm-option=-merge-constant
-fplugin-arg-dragonegg-llvm-option=-inline-threshold:1000
-lpthread -ldl -ljemalloc -lgfortran -lamdlibm
```

554.roms_r: Same as 549.fotonik3d_r

Benchmarks using both Fortran and C:

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

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

```
-std=c++98 -flto -Wl,-plugin-opt=-merge-constant
```

(Continued on next page)



SPEC CPU2017 Floating Point Rate Result

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Tested by: Dell Inc.

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Hardware Availability: Jan-2019

Software Availability: Feb-2019

Peak Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-Wl,-plugin-opt=-lsr-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 -finline-aggressive -lpthread -ldl  
-ljemalloc
```

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  
-fstruct-layout=3 -mllvm -vectorize-memory-aggressively -mno-avx2  
-mllvm -unroll-threshold=100 -fremap-arrays  
-mllvm -inline-threshold=1000 -finline-aggressive -O3 -mavx2 -madx  
-funroll-loops -ffast-math -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=-merge-constant  
-fplugin-arg-dragonegg-llvm-option=-inline-threshold:1000 -lpthread  
-ldl -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/aocc130-flags-revA2.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/aocc130-flags-revA2.xml>

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Tested with SPEC CPU2017 v1.0.5 on 2019-03-06 19:53:52-0500.

Report generated on 2019-04-02 16:54:57 by CPU2017 PDF formatter v6067.

Originally published on 2019-04-02.