



SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_fp_base = 265

PowerEdge R7425 (AMD EPYC 7601, 2.20 GHz)

SPECrate2017_fp_peak = 275

CPU2017 License: 55

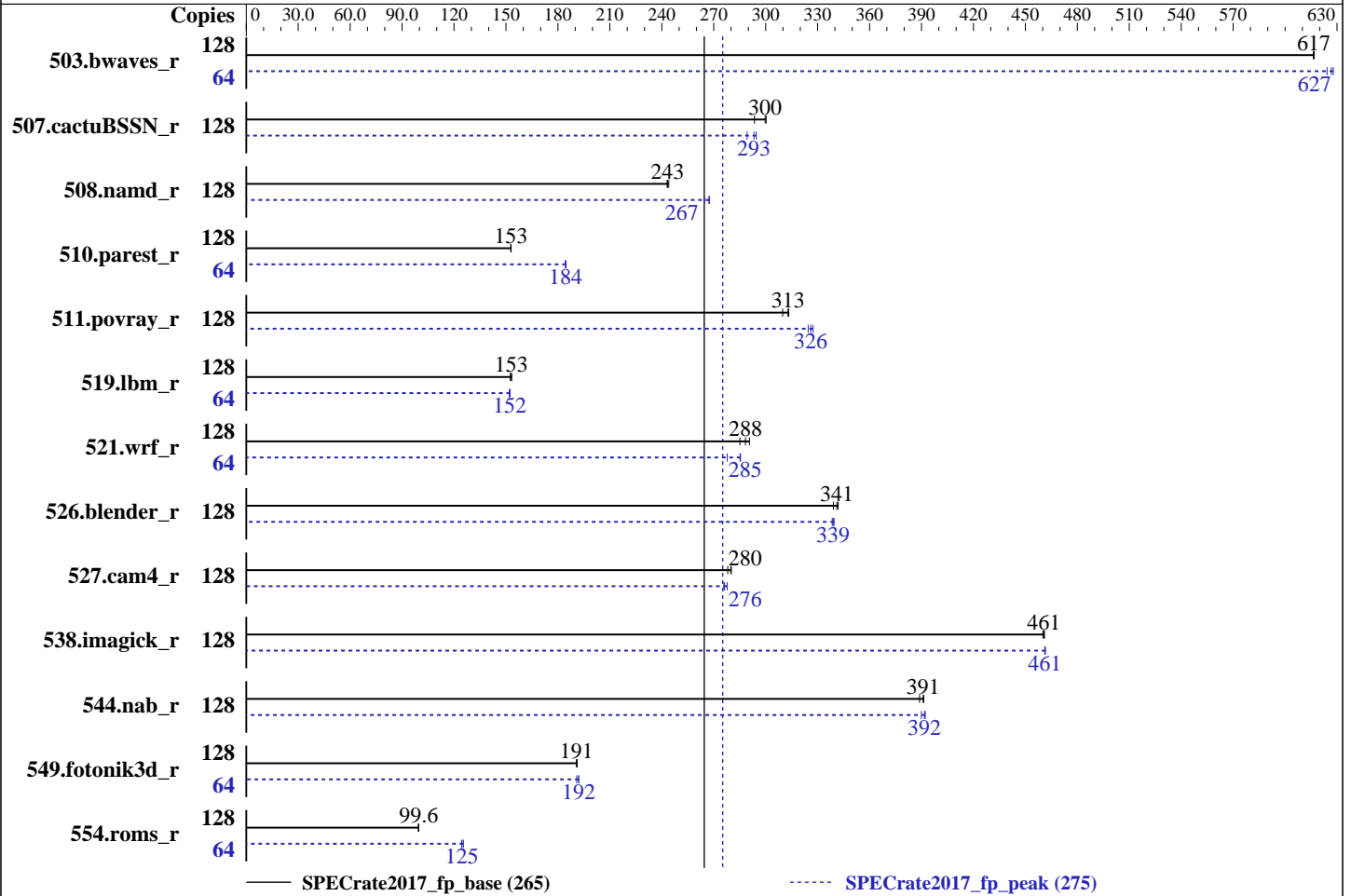
Test Date: Aug-2018

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2018

Tested by: Dell Inc.

Software Availability: Jul-2018



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 4DRx4 PC4-2667V-L)

Storage: 1 x 120 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3
 kernel 4.4.138-8

Compiler: C/C++: Version 1.0.0 of AOCC
 Fortran: Version 4.8.2 of GCC

Parallel: No
 Firmware: Version 62.5.1 released May-2018
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: jemalloc memory allocator library V4.5.0



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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	128	2083	616	2081	617	<u>2082</u>	<u>617</u>	64	1028	624	1022	628	<u>1024</u>	<u>627</u>
507.cactuBSSN_r	128	552	294	<u>541</u>	<u>300</u>	540	300	128	<u>553</u>	<u>293</u>	550	295	560	289
508.namd_r	128	500	243	498	244	<u>500</u>	<u>243</u>	128	455	267	<u>455</u>	<u>267</u>	460	265
510.parest_r	128	2192	153	<u>2190</u>	<u>153</u>	2189	153	64	908	184	<u>907</u>	<u>184</u>	907	185
511.povray_r	128	<u>955</u>	<u>313</u>	965	310	954	313	128	<u>917</u>	<u>326</u>	913	327	921	325
519.lbm_r	128	<u>881</u>	<u>153</u>	885	152	880	153	64	443	152	<u>443</u>	<u>152</u>	444	152
521.wrf_r	128	1006	285	<u>994</u>	<u>288</u>	987	291	64	502	285	516	278	<u>503</u>	<u>285</u>
526.blender_r	128	<u>572</u>	<u>341</u>	575	339	570	342	128	574	339	<u>575</u>	<u>339</u>	576	338
527.cam4_r	128	799	280	<u>800</u>	<u>280</u>	805	278	128	812	276	<u>810</u>	<u>276</u>	806	278
538.imagick_r	128	692	460	691	461	<u>691</u>	<u>461</u>	128	<u>690</u>	<u>461</u>	690	462	690	461
544.nab_r	128	554	389	550	391	<u>551</u>	<u>391</u>	128	552	390	<u>550</u>	<u>392</u>	549	392
549.fotonik3d_r	128	<u>2614</u>	<u>191</u>	2610	191	2615	191	64	<u>1299</u>	<u>192</u>	1307	191	1299	192
554.roms_r	128	<u>2042</u>	<u>99.6</u>	2047	99.4	2042	99.6	64	811	125	817	124	<u>816</u>	<u>125</u>

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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 1.0 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/amd1704-rate-libs-revD/64;/home/cpu2017-1.0.5/amd1704-rate-libs-revD/32:"
MALLOC_CONF = "lg_chunk:28"

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.4
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 2^21 =
2MiB.

Platform Notes

BIOS settings:
Memory Interleaving set to Channel Interleaving
Virtualization Technology disabled
System Profile set to Custom
CPU Power Management set to Maximum Performance
Memory Frequency set to Maximum Performance

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Platform Notes (Continued)

Turbo Boost enabled
 C States set to Autonomous
 Memory Patrol Scrub disabled
 Memory Refresh Rate set to 1x
 PCI ASPM L1 Link Power Management disabled
 Determinism Slider set to Power Determinism
 Sysinfo program /home/cpu2017-1.0.5/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-lz15 Thu Aug 23 02:48:41 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
 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 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 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: 2195.833
 BogoMIPS: 4391.66
 Virtualization: AMD-V
 L1d cache: 32K
 L1i cache: 64K

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Platform Notes (Continued)

```

L2 cache:          512K
L3 cache:          8192K
NUMA node0 CPU(s): 0,8,16,24,32,40,48,56,64,72,80,88,96,104,112,120
NUMA node1 CPU(s): 2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122
NUMA node2 CPU(s): 4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124
NUMA node3 CPU(s): 6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126
NUMA node4 CPU(s): 1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121
NUMA node5 CPU(s): 3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123
NUMA node6 CPU(s): 5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125
NUMA node7 CPU(s): 7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127
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
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 ssbd ibpb 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 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 64 72 80 88 96 104 112 120
node 0 size: 128686 MB
node 0 free: 128419 MB
node 1 cpus: 2 10 18 26 34 42 50 58 66 74 82 90 98 106 114 122
node 1 size: 129020 MB
node 1 free: 128804 MB
node 2 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124
node 2 size: 129020 MB
node 2 free: 128788 MB
node 3 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110 118 126
node 3 size: 129020 MB
node 3 free: 128776 MB
node 4 cpus: 1 9 17 25 33 41 49 57 65 73 81 89 97 105 113 121
node 4 size: 129020 MB
node 4 free: 128810 MB
node 5 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107 115 123
node 5 size: 129020 MB
node 5 free: 128810 MB
node 6 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109 117 125
node 6 size: 129020 MB

```

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Platform Notes (Continued)

```
node 6 free: 128807 MB
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111 119 127
node 7 size: 129019 MB
node 7 free: 128808 MB
node distances:
node  0  1  2  3  4  5  6  7
  0: 10 16 16 16 28 28 22 28
  1: 16 10 16 16 28 28 28 22
  2: 16 16 10 16 22 28 28 28
  3: 16 16 16 10 28 22 28 28
  4: 28 28 22 28 10 16 16 16
  5: 28 28 28 22 16 10 16 16
  6: 22 28 28 28 16 16 10 16
  7: 28 22 28 28 16 16 16 10
```

From /proc/meminfo

```
MemTotal:      1056596448 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

/usr/bin/lsb_release -d

SUSE Linux Enterprise Server 12 SP3

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-1z15 4.4.138-8.g8686768-default #1 SMP Mon Jun 25 17:25:25 UTC 2018
(8686768) 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
```

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Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline + IBPB

run-level 3 Aug 22 15:31

SPEC is set to: /home/cpu2017-1.0.5

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	144G	3.9G	140G	3%	/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 Dell Inc. 62.5.1 [MaxPerf C_En] 05/21/2018

Memory:

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

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.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)

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Compiler Version Notes (Continued)

```

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
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
GNU Fortran (GCC) 4.8.2
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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

```

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Compiler Version Notes (Continued)

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 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++

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

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Base Portability Flags (Continued)

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=-disable-vect-cmp  
-O3 -ffast-math -march=znver1 -fstruct-layout=2  
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2  
-mllvm -inline-threshold=1000 -mllvm -disable-vect-cmp -z muldefs  
-ljemalloc
```

C++ benchmarks:

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

Fortran benchmarks:

```
-flto -Wl,-plugin-opt=-merge-constant  
-Wl,-plugin-opt=-lsr-in-nested-loop -Wl,-plugin-opt=-disable-vect-cmp  
-O3 -mavx -madox -funroll-loops -ffast-math -z muldefs  
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option=-merge-constant  
-fplugin-arg-dragonegg-llvm-option=-disable-vect-cmp -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=-disable-vect-cmp  
-O3 -ffast-math -march=znver1 -fstruct-layout=2  
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2  
-mllvm -inline-threshold=1000 -mllvm -disable-vect-cmp -mavx -madox  
-funroll-loops -z muldefs -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=-merge-constant  
-fplugin-arg-dragonegg-llvm-option=-disable-vect-cmp -ljemalloc  
-lgfortran -lamdlibm
```

Benchmarks using both C and C++:

```
-flto -Wl,-plugin-opt=-merge-constant  
-Wl,-plugin-opt=-lsr-in-nested-loop -Wl,-plugin-opt=-disable-vect-cmp
```

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SPECrate2017_fp_peak = 275

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Aug-2018

Hardware Availability: Dec-2018

Software Availability: Jul-2018

Base Optimization Flags (Continued)

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

```
-O3 -ffast-math -march=znver1 -fstruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
-mllvm -inline-threshold=1000 -mllvm -disable-vect-cmp
-finline-aggressive -z muldefs -ljemalloc
```

Benchmarks using Fortran, C, and C++:

```
-flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -Wl,-plugin-opt=-disable-vect-cmp
-O3 -ffast-math -march=znver1 -fstruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
-mllvm -inline-threshold=1000 -mllvm -disable-vect-cmp
-finline-aggressive -mavx -madox -funroll-loops -z muldefs
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option=-merge-constant
-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

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



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Peak Optimization Flags

C benchmarks:

```
-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 -ljemalloc
```

C++ benchmarks:

```
-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 -ljemalloc
```

Fortran benchmarks:

```
-flto -Wl,-plugin-opt=-merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -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 -ljemalloc
-lgfortran -lamdlibm
```

Benchmarks using both Fortran and C:

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

```
527.cam4_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 -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
-ljemalloc -lgfortran -lamdlibm
```

Benchmarks using both C and C++:

```
-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 -ljemalloc
```

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```

-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 -ljemalloc

```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-11-13.html>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.html>

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

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-11-13.xml>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.xml>

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Tested with SPEC CPU2017 v1.0.5 on 2018-08-23 03:48:40-0400.

Report generated on 2018-11-13 15:14:53 by CPU2017 PDF formatter v6067.

Originally published on 2018-11-13.