



SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_fp_base = 230

PowerEdge R7425 (AMD EPYC 7401, 2.00 GHz)

SPECrate2017_fp_peak = 237

CPU2017 License: 55

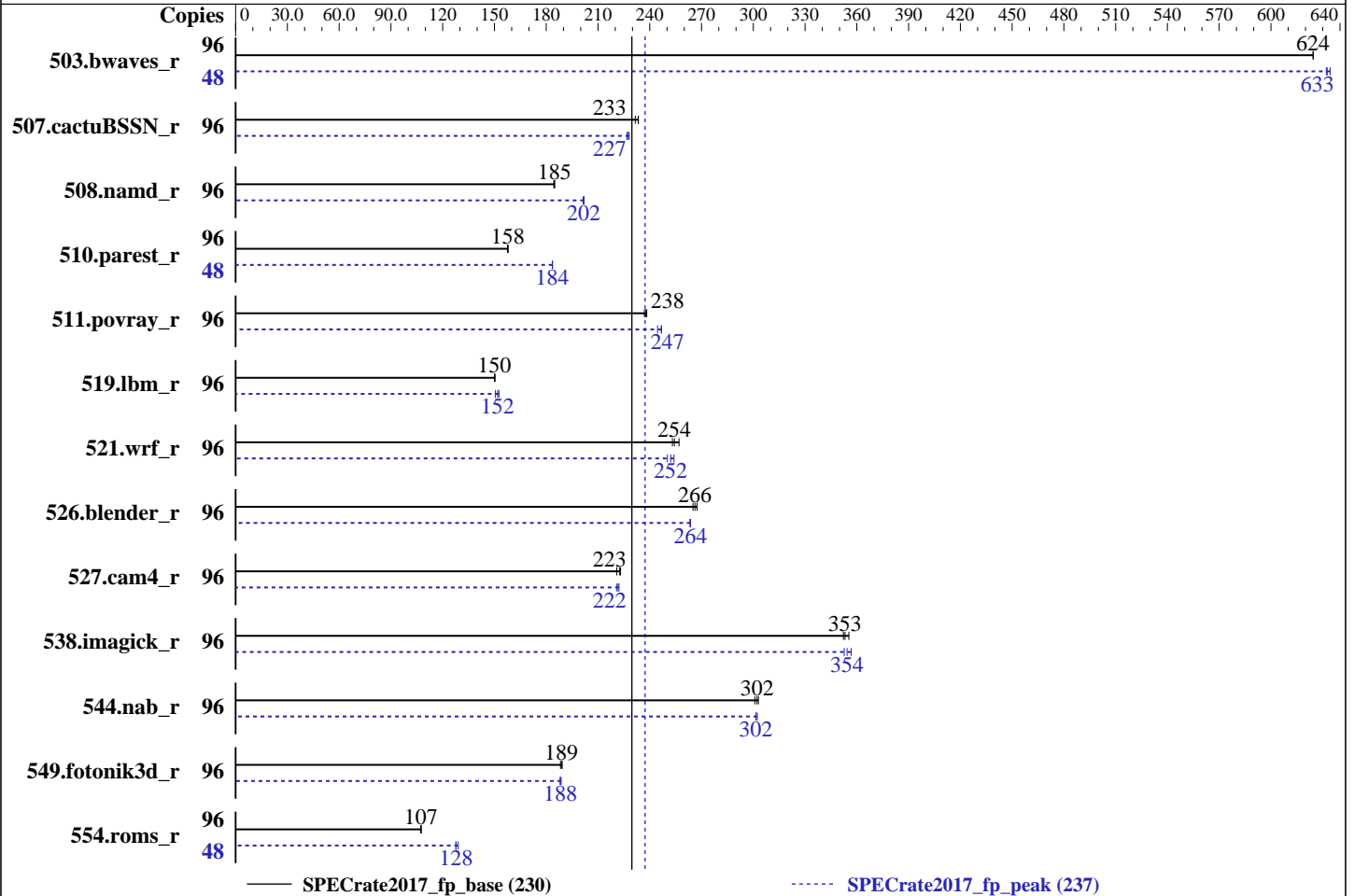
Test Date: Aug-2018

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2018

Tested by: Dell Inc.

Software Availability: Jul-2018



Hardware

CPU Name: AMD EPYC 7401
 Max MHz.: 3000
 Nominal: 2000
 Enabled: 48 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 / 3 cores
 Other: None
 Memory: 1 TB (16 x 64 GB 4DRx4 PC4-2667V-L)

Storage: 1 x 120GB 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	96	1542	624	1542	624	1541	625	48	761	633	759	634	762	632
507.cactuBSSN_r	96	521	233	521	233	525	232	96	534	227	536	227	533	228
508.namd_r	96	493	185	494	185	495	184	96	452	202	452	202	453	201
510.parest_r	96	1593	158	1592	158	1591	158	48	684	184	684	184	684	184
511.povray_r	96	943	238	941	238	946	237	96	908	247	909	247	917	245
519.lbm_r	96	675	150	673	150	675	150	96	667	152	672	151	663	153
521.wrf_r	96	850	253	837	257	846	254	96	859	250	846	254	853	252
526.blender_r	96	547	267	549	266	552	265	96	555	264	555	264	555	263
527.cam4_r	96	753	223	760	221	754	223	96	758	222	761	221	756	222
538.imagick_r	96	672	355	678	352	676	353	96	677	353	674	354	669	357
544.nab_r	96	537	301	533	303	535	302	96	534	302	536	302	536	302
549.fotonik3d_r	96	1987	188	1977	189	1981	189	96	1989	188	1983	189	1988	188
554.roms_r	96	1422	107	1418	108	1420	107	48	598	128	597	128	591	129

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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 $2^{21} = 2\text{MiB}$.

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

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Platform Notes (Continued)

Memory Frequency set to Maximum Performance
 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 Fri Aug 24 23:11:50 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 7401 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
physical 0: cores 0 1 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
physical 1: cores 0 1 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):          8
Vendor ID:              AuthenticAMD
CPU family:             23
Model:                  1
Model name:             AMD EPYC 7401 24-Core Processor
Stepping:               2
CPU MHz:                1996.216
BogoMIPS:               3992.43
Virtualization:         AMD-V
L1d cache:              32K
L1i cache:              64K
L2 cache:               512K
```

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Platform Notes (Continued)

```

L3 cache:                8192K
NUMA node0 CPU(s):      0,8,16,24,32,40,48,56,64,72,80,88
NUMA node1 CPU(s):      2,10,18,26,34,42,50,58,66,74,82,90
NUMA node2 CPU(s):      4,12,20,28,36,44,52,60,68,76,84,92
NUMA node3 CPU(s):      6,14,22,30,38,46,54,62,70,78,86,94
NUMA node4 CPU(s):      1,9,17,25,33,41,49,57,65,73,81,89
NUMA node5 CPU(s):      3,11,19,27,35,43,51,59,67,75,83,91
NUMA node6 CPU(s):      5,13,21,29,37,45,53,61,69,77,85,93
NUMA node7 CPU(s):      7,15,23,31,39,47,55,63,71,79,87,95
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 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
node 0 size: 128686 MB
node 0 free: 128455 MB
node 1 cpus: 2 10 18 26 34 42 50 58 66 74 82 90
node 1 size: 129020 MB
node 1 free: 128824 MB
node 2 cpus: 4 12 20 28 36 44 52 60 68 76 84 92
node 2 size: 129020 MB
node 2 free: 128833 MB
node 3 cpus: 6 14 22 30 38 46 54 62 70 78 86 94
node 3 size: 129020 MB
node 3 free: 128791 MB
node 4 cpus: 1 9 17 25 33 41 49 57 65 73 81 89
node 4 size: 129020 MB
node 4 free: 128829 MB
node 5 cpus: 3 11 19 27 35 43 51 59 67 75 83 91
node 5 size: 129020 MB
node 5 free: 128840 MB
node 6 cpus: 5 13 21 29 37 45 53 61 69 77 85 93
node 6 size: 129020 MB
node 6 free: 128838 MB

```

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Platform Notes (Continued)

```
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95
node 7 size: 129019 MB
node 7 free: 128833 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
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline + IBPB
```

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Platform Notes (Continued)

run-level 3 Aug 24 12:39 last=5

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)

Target: x86_64-unknown-linux-gnu

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Compiler Version Notes (Continued)

```

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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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
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You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
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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.

```

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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
 538.imagick_r: -DSPEC_LP64

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Base Portability Flags (Continued)

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  
-O3 -ffast-math -march=znver1 -fstruct-layout=2
```

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Base Optimization Flags (Continued)

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

```
-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



SPEC CPU2017 Floating Point Rate Result

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Dell Inc.

SPECrate2017_fp_base = 230

PowerEdge R7425 (AMD EPYC 7401, 2.00 GHz)

SPECrate2017_fp_peak = 237

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Aug-2018

Hardware Availability: Dec-2018

Software Availability: Jul-2018

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 -madox -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 -madox  
-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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