



SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_fp_base = 104

PowerEdge R7425 (AMD EPYC 7251, 2.10 GHz)

SPECrate2017_fp_peak = 105

CPU2017 License: 55

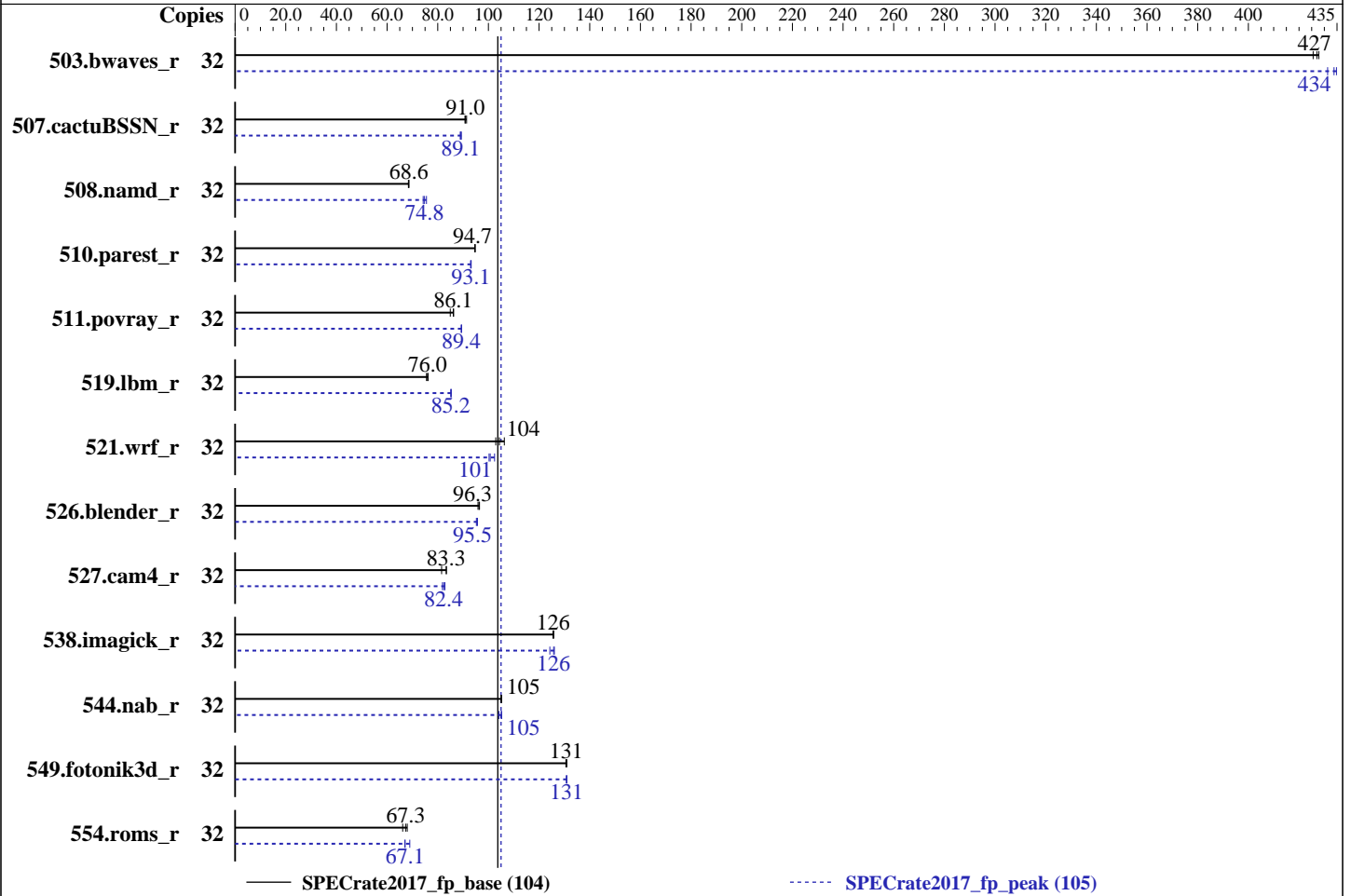
Test Date: Aug-2018

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2018

Tested by: Dell Inc.

Software Availability: Jul-2018



Hardware

CPU Name: AMD EPYC 7251
 Max MHz.: 2900
 Nominal: 2100
 Enabled: 16 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: 32 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 4DRx4 PC4-2667V-L, running at 2400)

Storage: 1 x 800 GB PCIe SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3
 kernel 4.4.126-94.22

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	32	<u>751</u>	<u>427</u>	750	428	754	426	32	744	431	<u>740</u>	<u>434</u>	738	435
507.cactuBSSN_r	32	446	90.7	<u>445</u>	<u>91.0</u>	443	91.4	32	<u>455</u>	<u>89.1</u>	454	89.3	456	88.9
508.namd_r	32	<u>443</u>	<u>68.6</u>	444	68.4	443	68.6	32	409	74.3	402	75.5	<u>407</u>	<u>74.8</u>
510.parest_r	32	<u>884</u>	<u>94.7</u>	884	94.7	884	94.7	32	901	93.0	<u>899</u>	<u>93.1</u>	898	93.2
511.povray_r	32	<u>868</u>	<u>86.1</u>	880	84.9	866	86.3	32	836	89.4	<u>836</u>	<u>89.4</u>	837	89.3
519.lbm_r	32	<u>444</u>	<u>76.0</u>	443	76.2	446	75.5	32	395	85.3	<u>396</u>	<u>85.2</u>	396	85.2
521.wrf_r	32	697	103	674	106	<u>687</u>	<u>104</u>	32	700	102	<u>712</u>	<u>101</u>	715	100
526.blender_r	32	508	95.9	<u>506</u>	<u>96.3</u>	505	96.5	32	509	95.7	512	95.2	<u>510</u>	<u>95.5</u>
527.cam4_r	32	687	81.5	671	83.4	<u>672</u>	<u>83.3</u>	32	<u>679</u>	<u>82.4</u>	676	82.8	684	81.9
538.imagick_r	32	<u>633</u>	<u>126</u>	634	125	633	126	32	641	124	<u>633</u>	<u>126</u>	631	126
544.nab_r	32	<u>512</u>	<u>105</u>	513	105	512	105	32	<u>513</u>	<u>105</u>	517	104	512	105
549.fotonik3d_r	32	<u>954</u>	<u>131</u>	952	131	955	131	32	<u>953</u>	<u>131</u>	952	131	953	131
554.roms_r	32	<u>755</u>	<u>67.3</u>	748	68.0	769	66.2	32	759	67.0	737	69.0	<u>757</u>	<u>67.1</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 2²¹ =
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-yyi5 Sun Aug 5 21:59:36 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 7251 8-Core Processor
 2 "physical id"s (chips)
 32 "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 : 8
 siblings : 16
 physical 0: cores 0 8 12 16 20 24 28
 physical 1: cores 0 8 12 16 20 24 28

From lscpu:
 Architecture: x86_64
 CPU op-mode(s): 32-bit, 64-bit
 Byte Order: Little Endian
 CPU(s): 32
 On-line CPU(s) list: 0-31
 Thread(s) per core: 2
 Core(s) per socket: 8
 Socket(s): 2
 NUMA node(s): 8
 Vendor ID: AuthenticAMD
 CPU family: 23
 Model: 1
 Model name: AMD EPYC 7251 8-Core Processor
 Stepping: 2
 CPU MHz: 2095.923
 BogoMIPS: 4191.84
 Virtualization: AMD-V
 L1d cache: 32K
 L1i cache: 64K
 L2 cache: 512K
 L3 cache: 4096K

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Platform Notes (Continued)

```

NUMA node0 CPU(s): 0,8,16,24
NUMA node1 CPU(s): 2,10,18,26
NUMA node2 CPU(s): 4,12,20,28
NUMA node3 CPU(s): 6,14,22,30
NUMA node4 CPU(s): 1,9,17,25
NUMA node5 CPU(s): 3,11,19,27
NUMA node6 CPU(s): 5,13,21,29
NUMA node7 CPU(s): 7,15,23,31

```

```

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 bpeext 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 8 16 24
node 0 size: 128687 MB
node 0 free: 128536 MB
node 1 cpus: 2 10 18 26
node 1 size: 129020 MB
node 1 free: 128881 MB
node 2 cpus: 4 12 20 28
node 2 size: 129020 MB
node 2 free: 128878 MB
node 3 cpus: 6 14 22 30
node 3 size: 129020 MB
node 3 free: 128879 MB
node 4 cpus: 1 9 17 25
node 4 size: 129020 MB
node 4 free: 128875 MB
node 5 cpus: 3 11 19 27
node 5 size: 129020 MB
node 5 free: 128853 MB
node 6 cpus: 5 13 21 29
node 6 size: 129020 MB
node 6 free: 128868 MB
node 7 cpus: 7 15 23 31

```

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Platform Notes (Continued)

```
node 7 size: 129019 MB
node 7 free: 128883 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: 1056597308 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-yyi5 4.4.126-94.22-default #1 SMP Wed Apr 11 07:45:03 UTC 2018 (9649989)

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 5 12:34

SPEC is set to: /home/cpu2017-1.0.5

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/nvme0n1p4	xf	703G	19G	684G	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, configured at 2400
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
Thread model: posix

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Compiler Version Notes (Continued)

```

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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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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You may redistribute copies of GNU Fortran
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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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```

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Compiler Version Notes (Continued)

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```
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
544.nab_r: -DSPEC_LP64
```

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Base Portability Flags (Continued)

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
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
```

(Continued on next page)



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Base Optimization Flags (Continued)

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

```
-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 -madx -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 = 104

PowerEdge R7425 (AMD EPYC 7251, 2.10 GHz)

SPECrate2017_fp_peak = 105

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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