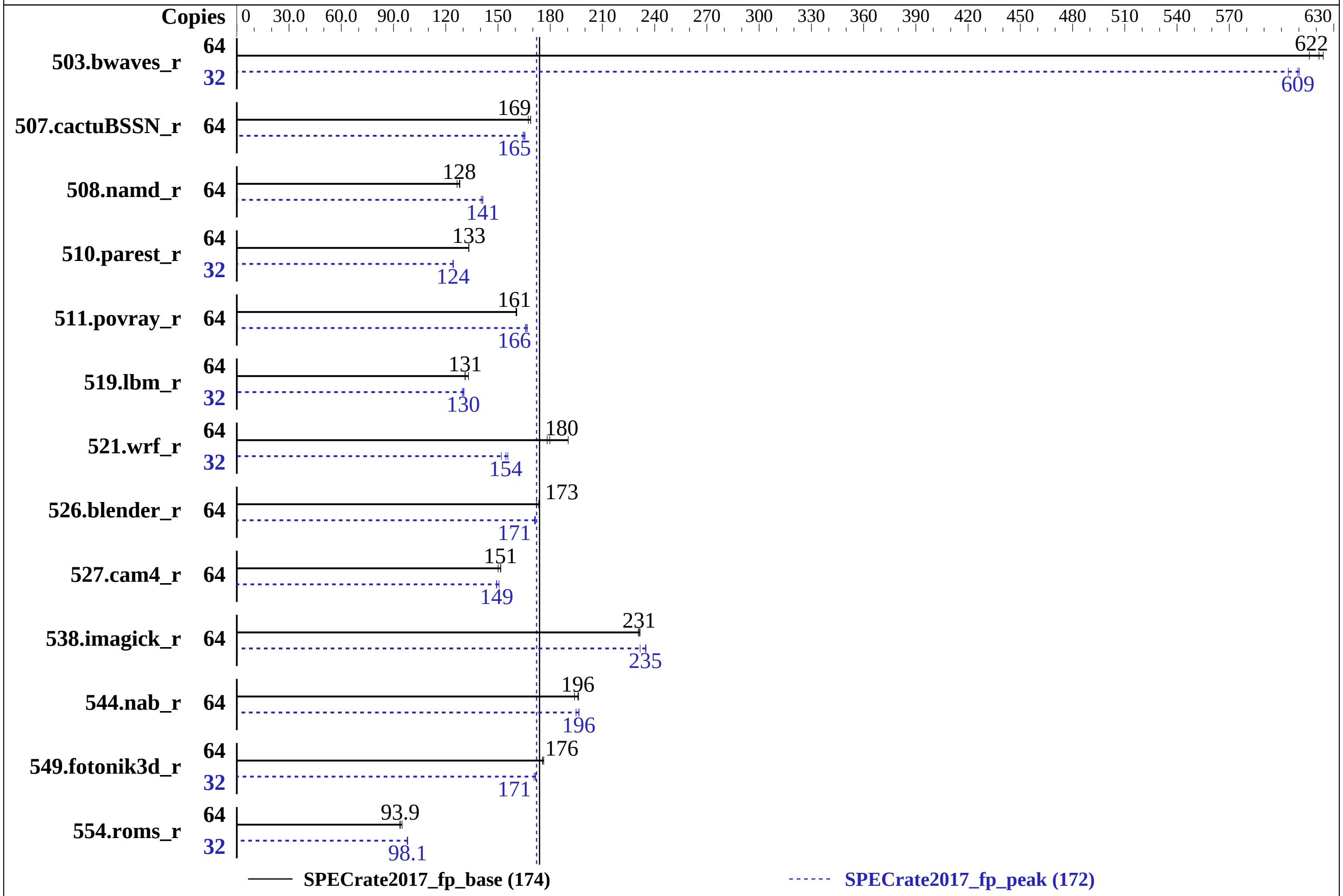
SPEC® CPU2017 Floating Point Rate Result

Cisco Systems	SPECrate2017_fp_base = 174
Cisco UCS C125 (AMD EPYC 7281)	SPECrate2017_fp_peak = 172

CPU2017 License:	9019	**Test Date:**	Jun-2018
Test Sponsor:	Cisco Systems	**Hardware Availability:**	Aug-2018
Tested by:	Cisco Systems	**Software Availability:**	May-2018



Hardware

CPU Name:	AMD EPYC 7281
Max MHz.:	2700
Nominal:	2100
Enabled:	32 cores, 2 chips, 2 threads/core
Orderable:	1,2 chip
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, 4 MB shared / 2 cores
Other:	None
Memory:	1 TB (16 x 64 GB 4Rx4 PC4-2667V-R)
Storage:	600 GB SAS HDD, 15K RPM
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 SP3 x86_64 kernel 4.4.120-94.17-default
Compiler:	C/C++: Version 1.0.0 of AOCC Fortran: Version 4.8.2 of GCC
Parallel:	No
Firmware:	Cisco Systems, Inc. BIOS Version C125.4.0.0.16.0511180518 released May-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

Cisco Systems
Cisco UCS C125 (AMD EPYC 7281)

SPECrate2017_fp_base = 174
SPECrate2017_fp_peak = 172

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems
Test Date: Jun-2018
Hardware Availability: Aug-2018
Software Availability: May-2018

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	64	**1033**	**622**	1029	624	1042	616	32	**527**	**609**	531	604	526	610
507.cactuBSSN_r	64	484	167	**480**	**169**	480	169	64	490	166	**491**	**165**	493	164
508.namd_r	64	481	126	475	128	**476**	**128**	64	433	140	430	141	**430**	**141**
510.parest_r	64	**1256**	**133**	1257	133	1255	133	32	673	124	675	124	**674**	**124**
511.povray_r	64	929	161	932	160	**931**	**161**	64	**899**	**166**	895	167	901	166
519.lbm_r	64	507	133	515	131	**514**	**131**	32	260	130	**259**	**130**	258	130
521.wrf_r	64	**798**	**180**	753	190	804	178	32	460	156	**464**	**154**	472	152
526.blender_r	64	566	172	**562**	**173**	562	173	64	568	172	**570**	**171**	570	171
527.cam4_r	64	738	152	**739**	**151**	746	150	64	743	151	751	149	**750**	**149**
538.imagick_r	64	690	231	687	232	**689**	**231**	64	**678**	**235**	687	232	677	235
544.nab_r	64	555	194	549	196	**550**	**196**	64	548	197	553	195	**548**	**196**
549.fotonik3d_r	64	1420	176	**1420**	**176**	1415	176	32	726	172	730	171	**727**	**171**
554.roms_r	64	1071	94.9	1086	93.7	**1083**	**93.9**	32	520	97.8	**518**	**98.1**	518	98.2

SPECrate2017_fp_base = 174

SPECrate2017_fp_peak = 172

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.
```

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/opt/cpu2017/amd1704-rate-libs-revC/64;/opt/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:
Performance Determinism set to Power Deterministic
 Sysinfo program /opt/cpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-7bdx Mon Jan  3 11:11:48 2011

 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 7281 16-Core Processor
       2  "physical id"s (chips)
       64 "processors"
```

(Continued on next page)

Platform Notes (Continued)

```
   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 4 5 8 9 12 13 16 17 20 21 24 25 28 29
      physical 1: cores 0 1 4 5 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 7281 16-Core Processor
     Stepping:              2
     CPU MHz:               2100.000
     CPU max MHz:           2100.0000
     CPU min MHz:           1200.0000
     BogoMIPS:              4191.97
     Virtualization:        AMD-V
     L1d cache:             32K
     L1i cache:             64K
     L2 cache:              512K
     L3 cache:              4096K
     NUMA node0 CPU(s):     0-3,32-35
     NUMA node1 CPU(s):     4-7,36-39
     NUMA node2 CPU(s):     8-11,40-43
     NUMA node3 CPU(s):     12-15,44-47
     NUMA node4 CPU(s):     16-19,48-51
     NUMA node5 CPU(s):     20-23,52-55
     NUMA node6 CPU(s):     24-27,56-59
     NUMA node7 CPU(s):     28-31,60-63
     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 retpoline retpoline_amd npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
     flushbyasid decodeassists pausefilter pfthreshold vmmcall avic fsgsbase bmi1 avx2
```

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Platform Notes (Continued)

```
     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 32 33 34 35
   node 0 size: 128831 MB
   node 0 free: 128626 MB
   node 1 cpus: 4 5 6 7 36 37 38 39
   node 1 size: 129021 MB
   node 1 free: 128890 MB
   node 2 cpus: 8 9 10 11 40 41 42 43
   node 2 size: 129021 MB
   node 2 free: 128878 MB
   node 3 cpus: 12 13 14 15 44 45 46 47
   node 3 size: 129021 MB
   node 3 free: 128873 MB
   node 4 cpus: 16 17 18 19 48 49 50 51
   node 4 size: 129021 MB
   node 4 free: 128893 MB
   node 5 cpus: 20 21 22 23 52 53 54 55
   node 5 size: 129021 MB
   node 5 free: 128898 MB
   node 6 cpus: 24 25 26 27 56 57 58 59
   node 6 size: 129021 MB
   node 6 free: 128851 MB
   node 7 cpus: 28 29 30 31 60 61 62 63
   node 7 size: 116923 MB
   node 7 free: 116793 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

 From /proc/meminfo
    MemTotal:       1044359956 kB
    HugePages_Total:       0
```

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Platform Notes (Continued)

```
   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-7bdx 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 2 03:28

SPEC is set to: /opt/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   450G   19G  432G   5% /

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 Cisco Systems, Inc. C125.4.0.0.16.0511180518 05/11/2018
  Memory:
   16x 0xCE00 M386A8K40BM2-CTD 64 GB 4 rank 2667

(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
```

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Compiler Version Notes (Continued)

```
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
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
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.
```

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Compiler Version Notes (Continued)

```
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.
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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
------------------------------------------------------------------------------

==============================================================================
 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++

Fortran benchmarks:
clang gfortran

Benchmarks using both Fortran and C:
clang gfortran

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Base Compiler Invocation (Continued)

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
```

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

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Base Optimization Flags (Continued)

Benchmarks using both Fortran 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 -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 -ffast-math -march=znver1 -fstruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2
-inline-threshold=1000 -finline-aggressive -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`

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 -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 -mavx -ffast-math -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 -mavx2 -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

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Peak Optimization Flags (Continued)

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/aocc100-flags-revC-I.2018-02-16.html
http://www.spec.org/cpu2017/flags/gcc.2018-02-16.html
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-V1-revA.html

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

http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.xml
http://www.spec.org/cpu2017/flags/gcc.2018-02-16.xml
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-V1-revA.xml

Tested with SPEC CPU2017 v1.0.2 on 2011-01-03 14:11:47-0500.
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