



SPEC® CPU2017 Floating Point Rate Result

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Supermicro

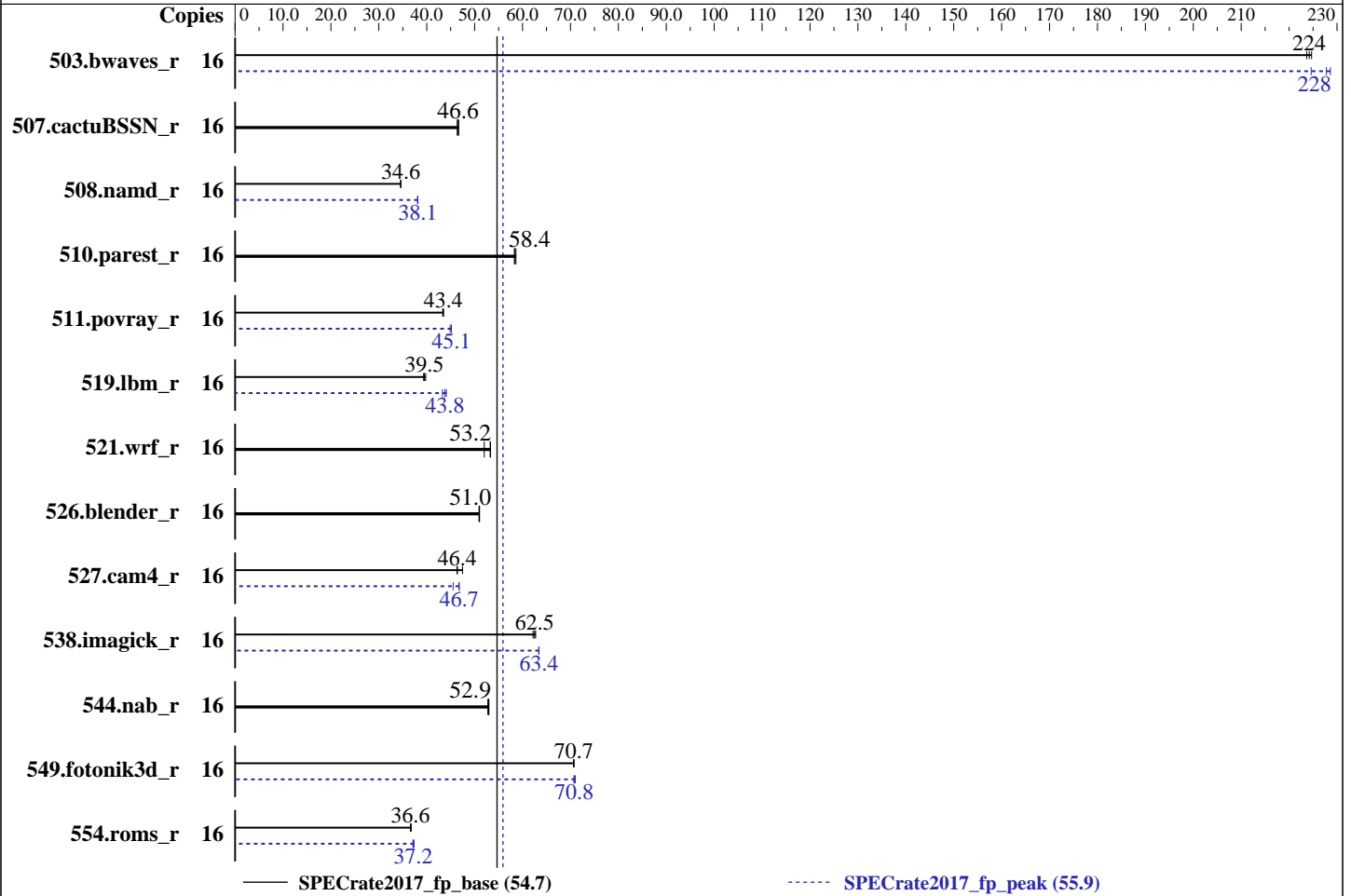
A+ Server 1113S-WN10RT
(H11SSW-NT, AMD EPYC 7261)

SPECrate2017_fp_base = 54.7

SPECrate2017_fp_peak = 55.9

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018



Hardware

CPU Name: AMD EPYC 7261
Max MHz.: 2900
Nominal: 2500
Enabled: 8 cores, 1 chip, 2 threads/core
Orderable: 1 chip
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
Other: None
Memory: 512 GB (8 x 64 GB 4Rx4 PC4-2666V-L)
Storage: 1 x 200 GB SATA III SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3 (x86_64)
kernel 4.4.114-94.11-default
Compiler: C/C++: Version 1.0.0 of AOCC
Fortran: Version 4.8.2 of GCC
Parallel: No
Firmware: Version 1.0 released Sep-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



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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	16	716	224	717	224	714	225	16	704	228	714	225	702	229
507.cactuBSSN_r	16	434	46.7	437	46.4	435	46.6	16	434	46.7	437	46.4	435	46.6
508.namd_r	16	440	34.6	439	34.6	440	34.6	16	399	38.1	399	38.1	399	38.1
510.parest_r	16	714	58.6	717	58.4	718	58.3	16	714	58.6	717	58.4	718	58.3
511.povray_r	16	862	43.3	860	43.4	859	43.5	16	828	45.1	828	45.1	833	44.9
519.lbm_r	16	429	39.4	424	39.8	427	39.5	16	385	43.8	390	43.3	382	44.1
521.wrf_r	16	672	53.3	673	53.2	689	52.0	16	672	53.3	673	53.2	689	52.0
526.blender_r	16	479	50.9	478	51.0	478	51.0	16	479	50.9	478	51.0	478	51.0
527.cam4_r	16	589	47.5	603	46.4	604	46.3	16	599	46.7	598	46.8	615	45.5
538.imagick_r	16	640	62.2	634	62.7	637	62.5	16	628	63.4	627	63.4	627	63.4
544.nab_r	16	508	53.0	509	52.9	510	52.8	16	508	53.0	509	52.9	510	52.8
549.fotonik3d_r	16	882	70.7	883	70.6	881	70.7	16	881	70.8	878	71.0	881	70.8
554.roms_r	16	694	36.6	694	36.6	692	36.8	16	684	37.2	681	37.3	685	37.1

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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/amd1704-rate-libs-revD/64"`
`MALLOC_CONF = "lg_chunk:28"`

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

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:

Determinism Slider = Power

sysinfo program `/home/cpu2017/bin/sysinfo`

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on linux-pm02 Sat Dec 15 00:22:25 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 7261 8-Core Processor

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Platform Notes (Continued)

```
1 "physical id"s (chips)
16 "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 4 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):                16
On-line CPU(s) list:   0-15
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):             1
NUMA node(s):         4
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                1
Model name:            AMD EPYC 7261 8-Core Processor
Stepping:              2
CPU MHz:               2500.000
CPU max MHz:           2500.0000
CPU min MHz:           1200.0000
BogoMIPS:              4999.71
Virtualization:        AMD-V
L1d cache:             32K
L1i cache:             64K
L2 cache:              512K
L3 cache:              8192K
NUMA node0 CPU(s):    0,1,8,9
NUMA node1 CPU(s):    2,3,10,11
NUMA node2 CPU(s):    4,5,12,13
NUMA node3 CPU(s):    6,7,14,15
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 bml avx2
smep bmi2 rdseed adx smap clflushopt sha_ni xsaveopt xsavec xgetbv1 clzero irperf
ibpb overflow_recov succor smca
```

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Platform Notes (Continued)

```
/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: 4 nodes (0-3)
node 0 cpus: 0 1 8 9
node 0 size: 128827 MB
node 0 free: 128689 MB
node 1 cpus: 2 3 10 11
node 1 size: 129022 MB
node 1 free: 128867 MB
node 2 cpus: 4 5 12 13
node 2 size: 129022 MB
node 2 free: 128890 MB
node 3 cpus: 6 7 14 15
node 3 size: 129022 MB
node 3 free: 128889 MB
node distances:
node 0 1 2 3
0: 10 16 16 16
1: 16 10 16 16
2: 16 16 10 16
3: 16 16 16 10
```

```
From /proc/meminfo
MemTotal: 528276592 kB
HugePages_Total: 0
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:
```

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Platform Notes (Continued)

Linux linux-pm02 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
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: Barriers
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline + IBPB

run-level 3 Dec 14 15:04

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	145G	5.7G	139G	4%	/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 American Megatrends Inc. 1.0 09/04/2018

Memory:

8x NO DIMM NO DIMM
8x Samsung 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
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
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Compiler Version Notes (Continued)

=====
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
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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
Copyright (C) 2013 Free Software Foundation, Inc.
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Compiler Version Notes (Continued)

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

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

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Base Portability Flags (Continued)

```
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=-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 -madx -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 -madx
-funroll-loops -z muldefs -fplugin=dragonegg.so
```

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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  
-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
```



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Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
519.lbm_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 -ljemalloc
```

538.imagick_r: Same as 519.lbm_r

544.nab_r: basepeak = yes

C++ benchmarks:

```
508.namd_r: -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
```

510.parest_r: basepeak = yes

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: basepeak = yes

```
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
```

(Continued on next page)



SPEC CPU2017 Floating Point Rate Result

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Supermicro

A+ Server 1113S-WN10RT
(H11SSW-NT, AMD EPYC 7261)

SPECrate2017_fp_base = 54.7

SPECrate2017_fp_peak = 55.9

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018

Peak Optimization Flags (Continued)

527.cam4_r (continued):

```
-fplugin-arg-dragonegg-llvm-option=-inline-threshold:1000  
-ljemalloc -lgfortran -lamdlibm
```

Benchmarks using both C and C++:

```
511.povray_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 -finline-aggressive  
-ljemalloc
```

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

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>

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Naples-revD.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>

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Naples-revD.xml>

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