



SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Supermicro

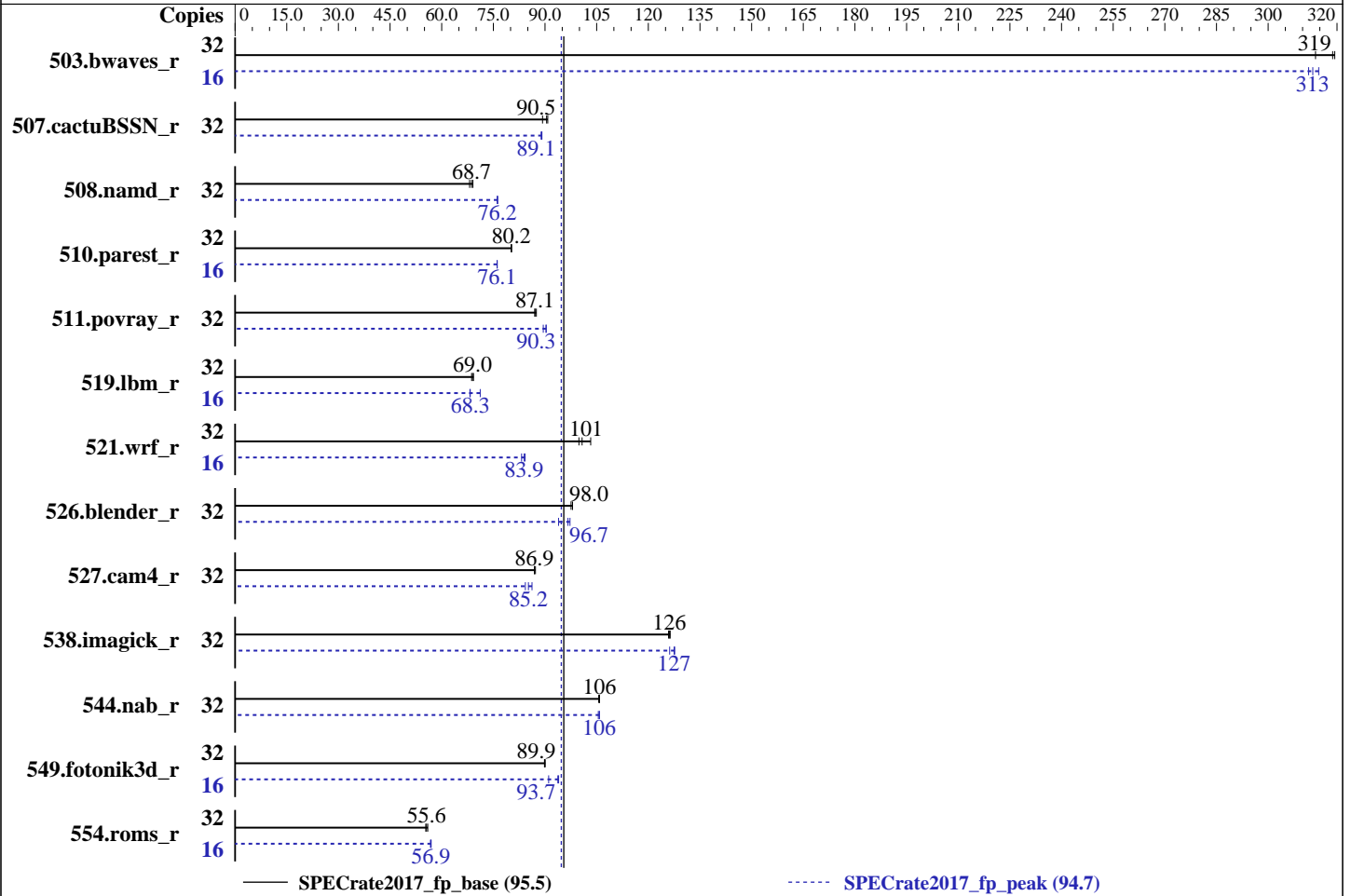
A+ Server 1013S-MTR
(H11SSL-i, AMD EPYC 7351)

SPECrate2017_fp_base = 95.5

SPECrate2017_fp_peak = 94.7

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

Test Date: May-2018
Hardware Availability: Jun-2017
Software Availability: Feb-2018



Hardware

CPU Name: AMD EPYC 7351
Max MHz.: 2900
Nominal: 2400
Enabled: 16 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, 8 MB shared / 2 cores
Other: None
Memory: 512 GB (8 x 64 GB 4Rx4 PC4-2666V-L)
Storage: 1 x 200 GB SATAIII 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: Supermicro BIOS version 1.0a released Feb-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	32	1005	319	1007	319	1023	314	16	515	312	513	313	510	315
507.cactuBSSN_r	32	448	90.5	446	90.8	454	89.3	32	456	88.9	455	89.1	455	89.1
508.namd_r	32	446	68.1	443	68.7	440	69.1	32	399	76.2	399	76.2	399	76.2
510.parest_r	32	1044	80.2	1043	80.3	1044	80.2	16	550	76.1	550	76.1	550	76.1
511.povray_r	32	858	87.1	854	87.5	858	87.0	32	835	89.5	828	90.3	827	90.4
519.lbm_r	32	489	69.0	491	68.7	487	69.2	16	247	68.3	247	68.2	237	71.2
521.wrf_r	32	711	101	694	103	718	99.8	16	431	83.2	427	83.9	425	84.2
526.blender_r	32	497	98.0	500	97.6	497	98.0	32	504	96.7	519	93.9	501	97.3
527.cam4_r	32	642	87.2	644	86.9	644	86.9	32	657	85.2	664	84.3	649	86.2
538.imagick_r	32	630	126	632	126	631	126	32	631	126	623	128	624	127
544.nab_r	32	510	106	509	106	509	106	32	509	106	511	105	509	106
549.fotonik3d_r	32	1388	89.8	1388	89.9	1385	90.1	16	685	91.1	664	94.0	665	93.7
554.roms_r	32	915	55.6	918	55.4	909	56.0	16	447	56.9	447	56.9	448	56.7

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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.



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General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/amd1704-rate-libs-revC/64;/home/cpu2017/amd1704-rate-libs-revC/32:"
MALLOCONF = "lg_chunk:28"

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/>

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 MALLOCONF 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: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-pm02 Sat May 12 02:35:46 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 7351 16-Core Processor
1 "physical id"s (chips)
32 "processors"

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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
```

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:    16
Socket(s):              1
NUMA node(s):          4
Vendor ID:              AuthenticAMD
CPU family:             23
Model:                  1
Model name:             AMD EPYC 7351 16-Core Processor
Stepping:               2
CPU MHz:                2400.000
CPU max MHz:            2400.0000
CPU min MHz:            1200.0000
BogoMIPS:               4799.46
Virtualization:        AMD-V
L1d cache:              32K
L1i cache:              64K
L2 cache:               512K
L3 cache:               8192K
NUMA node0 CPU(s):     0-3,16-19
NUMA node1 CPU(s):     4-7,20-23
NUMA node2 CPU(s):     8-11,24-27
NUMA node3 CPU(s):     12-15,28-31
```

```
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 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
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
```

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Platform Notes (Continued)

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 2 3 16 17 18 19
node 0 size: 128841 MB
node 0 free: 128679 MB
node 1 cpus: 4 5 6 7 20 21 22 23
node 1 size: 129019 MB
node 1 free: 128854 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 129019 MB
node 2 free: 128843 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 129017 MB
node 3 free: 128870 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: 528278648 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:
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

```

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Platform Notes (Continued)

run-level 3 May 11 17:07

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	145G	2.9G	142G	2%	/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. 1.0a 02/22/2018

Memory:

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

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.
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.
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

=====
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)

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
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 -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(gfortran) -O3(clang) -mavx -madox  
-funroll-loops -ffast-math -z muldefs -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=" -disable-vect-cmp" -ljemalloc  
-lgfortran -lamdlibm
```

Benchmarks using both Fortran and C:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-disable-vect-cmp -O3(clang) -ffast-math -march=znver1  
-fstruct-layout=2 -mllvm -unroll-threshold=100 -fremap-arrays  
-mno-avx2 -inline-threshold=1000 -O3(gfortran) -mavx -madox  
-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(clang) -ffast-math -march=znver1  
-fstruct-layout=2 -mllvm -unroll-threshold=100 -fremap-arrays  
-mno-avx2 -inline-threshold=1000 -finline-aggressive -O3(gfortran)
```

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-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
```

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Peak Optimization Flags (Continued)

Fortran benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-O3(gfortran) -O3(clang) -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(clang) -mavx -ffast-math  
-O3(gfortran) -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(gfortran) -O3(clang) -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
```

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/gcc.2018-02-16.html>

<http://www.spec.org/cpu2017/flags/aoccl100-flags-revC-I.2018-02-16.html>

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



SPEC CPU2017 Floating Point Rate Result

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Supermicro

A+ Server 1013S-MTR
(H11SSL-i, AMD EPYC 7351)

SPECrate2017_fp_base = 95.5

SPECrate2017_fp_peak = 94.7

CPU2017 License: 001176

Test Sponsor: Supermicro

Tested by: Supermicro

Test Date: May-2018

Hardware Availability: Jun-2017

Software Availability: Feb-2018

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

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

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.xml>

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

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