



# SPEC® CPU2017 Floating Point Rate Result

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**Sugon**

**SPECrate2017\_fp\_base = 260**

**SPECrate2017\_fp\_peak = Not Run**

**CPU2017 License:** 9046

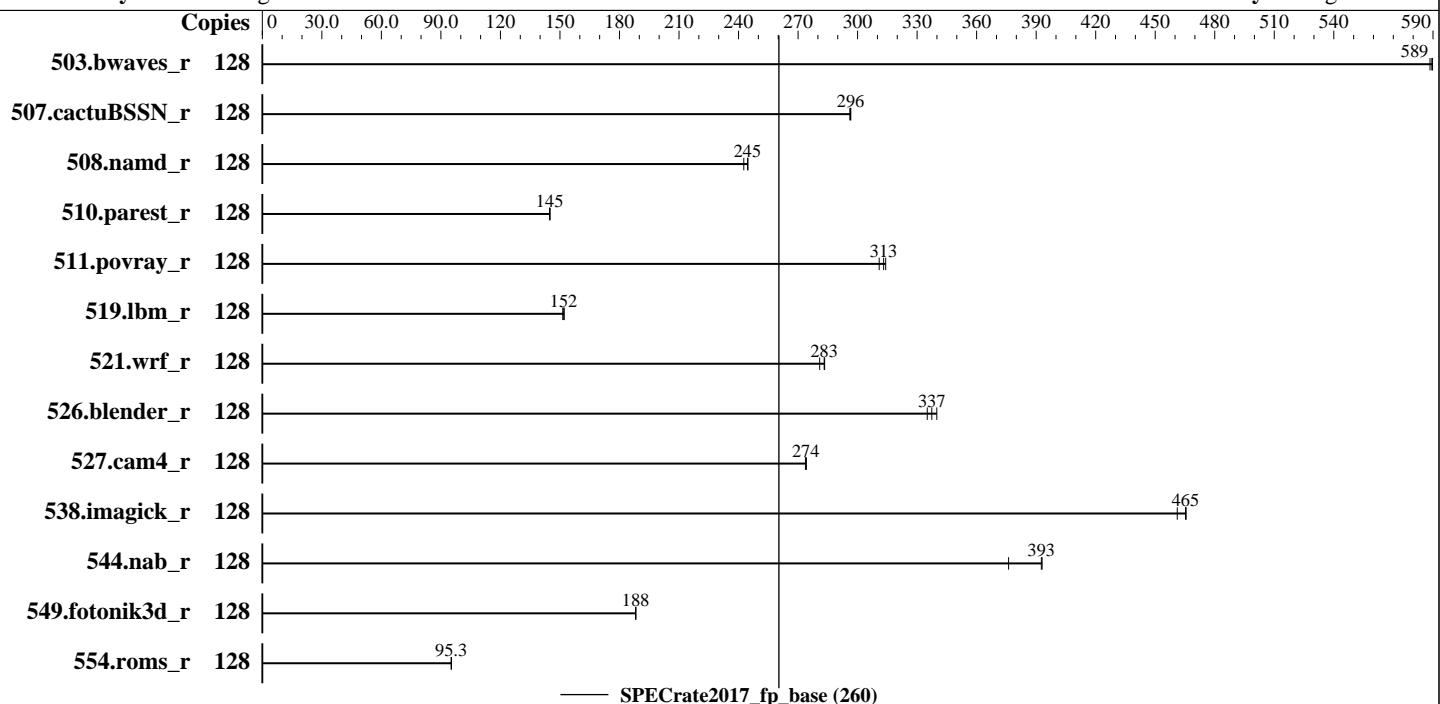
**Test Date:** Dec-2017

**Test Sponsor:** Sugon

**Hardware Availability:** Dec-2017

**Tested by:** Sugon

**Software Availability:** Aug-2017



## Hardware

CPU Name: AMD EPYC 7601  
 Max MHz.: 3200  
 Nominal: 2200  
 Enabled: 64 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 / 4 cores  
 Other: None  
 Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2667V-L)  
 Storage: 1 x 800 GB SATA, SSD  
 Other: None

## Software

OS: SUSE Linux Enterprise Server 12 SP3 kernel 4.4.73-5-default  
 Compiler: C/C++: Version 1.0.0 of AOCC Fortran: Version 4.8.2 of GCC  
 Parallel: No  
 Firmware: American Megatrends Inc. BIOS Version 0WYSZ018 released Aug-2017  
 File System: ext4  
 System State: Run level 3 (Multi User)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None



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**Sugon A620-G30 (AMD EPYC 7601)**

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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	128	2181	588	2176	590	<b>2178</b>	<b>589</b>							
507.cactusBSSN_r	128	546	297	<b>547</b>	<b>296</b>	547	296							
508.namd_r	128	501	243	<b>497</b>	<b>245</b>	497	245							
510.parest_r	128	<b>2312</b>	<b>145</b>	2309	145	2313	145							
511.povray_r	128	961	311	951	314	<b>954</b>	<b>313</b>							
519.lbm_r	128	887	152	<b>888</b>	<b>152</b>	891	151							
521.wrf_r	128	1012	283	1021	281	<b>1013</b>	<b>283</b>							
526.blender_r	128	573	340	582	335	<b>578</b>	<b>337</b>							
527.cam4_r	128	818	274	817	274	<b>817</b>	<b>274</b>							
538.imagick_r	128	684	466	690	461	<b>684</b>	<b>465</b>							
544.nab_r	128	573	376	<b>549</b>	<b>393</b>	548	393							
549.fotonik3d_r	128	2649	188	<b>2651</b>	<b>188</b>	2652	188							
554.roms_r	128	2136	95.2	2135	95.3	<b>2135</b>	<b>95.3</b>							

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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

runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <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:  
MALLOC_CONF = "lg_chunk:28"
```

The AMD64 AOCC Compiler Suite is available at

<http://developer.amd.com/tools-and-sdks/cpu-development/amd-optimizing-cc-compiler/>

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

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/>

## Platform Notes

BIOS settings:

Determinism Slider = Power

cTDP Control = Manual

cTDP = 200

This system Sugon A620-G30 is electrically equal with Sugon A420-G30 populated with the same processors and memories.

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on localhost Sun Dec 10 09:07:52 2017

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 7601 32-Core Processor

2 "physical id"s (chips)

128 "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 : 32

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## Platform Notes (Continued)

```
siblings : 64
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
```

From lscpu:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                128
On-line CPU(s) list:  0-127
Thread(s) per core:   2
Core(s) per socket:   32
Socket(s):             2
NUMA node(s):          8
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                 1
Model name:            AMD EPYC 7601 32-Core Processor
Stepping:               2
CPU MHz:               1200.000
CPU max MHz:           2200.0000
CPU min MHz:           1200.0000
BogoMIPS:              4391.27
Virtualization:        AMD-V
L1d cache:              32K
L1i cache:              64K
L2 cache:               512K
L3 cache:               8192K
NUMA node0 CPU(s):     0-7,64-71
NUMA node1 CPU(s):     8-15,72-79
NUMA node2 CPU(s):     16-23,80-87
NUMA node3 CPU(s):     24-31,88-95
NUMA node4 CPU(s):     32-39,96-103
NUMA node5 CPU(s):     40-47,104-111
NUMA node6 CPU(s):     48-55,112-119
NUMA node7 CPU(s):     56-63,120-127
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 aperfmpfperf eagerfpu dni
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 skininit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx arat cpb
hw_pstate 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 xsavemovopt xsavemovc xgetbv1 clzero irperf overflow_recov succor smca
```

/proc/cpuinfo cache data

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## Platform Notes (Continued)

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 4 5 6 7 64 65 66 67 68 69 70 71
node 0 size: 128912 MB
node 0 free: 128681 MB
node 1 cpus: 8 9 10 11 12 13 14 15 72 73 74 75 76 77 78 79
node 1 size: 129021 MB
node 1 free: 128811 MB
node 2 cpus: 16 17 18 19 20 21 22 23 80 81 82 83 84 85 86 87
node 2 size: 129021 MB
node 2 free: 128808 MB
node 3 cpus: 24 25 26 27 28 29 30 31 88 89 90 91 92 93 94 95
node 3 size: 129021 MB
node 3 free: 128814 MB
node 4 cpus: 32 33 34 35 36 37 38 39 96 97 98 99 100 101 102 103
node 4 size: 129021 MB
node 4 free: 128842 MB
node 5 cpus: 40 41 42 43 44 45 46 47 104 105 106 107 108 109 110 111
node 5 size: 129021 MB
node 5 free: 128846 MB
node 6 cpus: 48 49 50 51 52 53 54 55 112 113 114 115 116 117 118 119
node 6 size: 129021 MB
node 6 free: 128852 MB
node 7 cpus: 56 57 58 59 60 61 62 63 120 121 122 123 124 125 126 127
node 7 size: 129020 MB
node 7 free: 128850 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:      1056829576 kB
HugePages_Total:        0
Hugepagesize:     2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3
```

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## Platform Notes (Continued)

```
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 localhost 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64
x86_64 x86_64 GNU/Linux

run-level 3 Dec 8 10:11

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        ext4  722G  209G  513G  29%  /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. 0WYSZ018 08/22/2017
Memory:
16x Micron Technology 72ASS8G72LZ-2G6B2 64 GB 4 rank 2666
16x Unknown Unknown

(End of data from sysinfo program)
```

## Compiler Version Notes

```
=====
CC 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
-----
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) 510.parest\_r(base)

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) 526.blender\_r(base)

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)

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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## Compiler Version Notes (Continued)

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=====

FC 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)

=====

GNU Fortran (GCC) 4.8.2

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=====

CC 521.wrf\_r(base) 527.cam4\_r(base)

=====

GNU Fortran (GCC) 4.8.2

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under the terms of the GNU General Public License.

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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

(Continued on next page)



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## Base Compiler Invocation (Continued)

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
-Wl,-plugin-opt=-lsr-in-nested-loop -disable-vect-cmp -O3 -ffast-math
-march=znver1 -fstruct-layout=2 -mllvm -unroll-threshold=100
-freemap-arrays -mno-avx2 -inline-threshold=1000 -z muldefs -ljemalloc
```

C++ benchmarks:

```
-flto -Wl,-plugin-opt= -merge-constant
-Wl,-plugin-opt=-lsr-in-nested-loop -disable-vect-cmp -O3
-march=znver1 -mllvm -unroll-threshold=100 -finline-aggressive
-freemap-arrays -inline-threshold=1000 -z muldefs -ljemalloc
```

Fortran benchmarks:

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

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CPU2017 License: 9046	<b>Test Date:</b> Dec-2017
Test Sponsor: Sugon	<b>Hardware Availability:</b> Dec-2017
Tested by: Sugon	<b>Software Availability:</b> Aug-2017

## Base Optimization Flags (Continued)

## Benchmarks using both Fortran and C:

```
-flicht -Wl,-plugin-opt= -merge-constant  
-Wl,-plugin-opt=-lslr-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 -madx -funroll-loops -z muldefs  
-fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option="-merge-constant -disable-vect-cmp"  
-ljemalloc -lgfortran -lamdlibm
```

### Benchmarks using both C and C++:

```
-flio -Wl,-plugin-opt= -merge-constant  
-Wl,-plugin-opt=-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++:

```
Benchmarks using Fortran, C, and C++:  
-fno -Wl,-plugin-opt= -merge-constant  
-Wl,-plugin-opt=-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) -mavx -madx -funroll-loops  
-z muldefs -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option="-merge-constant -disable-vect-cmp"  
-liemalloc
```

The flags files that were used to format this result can be browsed at [here](#).

<http://www.spec.org/cpu2017/flags/gcc.2017-11-20.html>  
<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.html>  
<http://www.spec.org/cpu2017/flags/Sugon-Naples-Platform-Settings-revC-I.html>

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

<http://www.spec.org/cpu2017/flags/gcc.2017-11-20.xml>  
<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.xml>  
<http://www.spec.org/cpu2017/flags/Suqon-Naples-Platform-Settings-revC-I.xml>

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Tested with SPEC CPU2017 v1.0.2 on 2017-12-09 20:07:51-0500

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