



SPEC® CPU2017 Integer Rate Result

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Supermicro

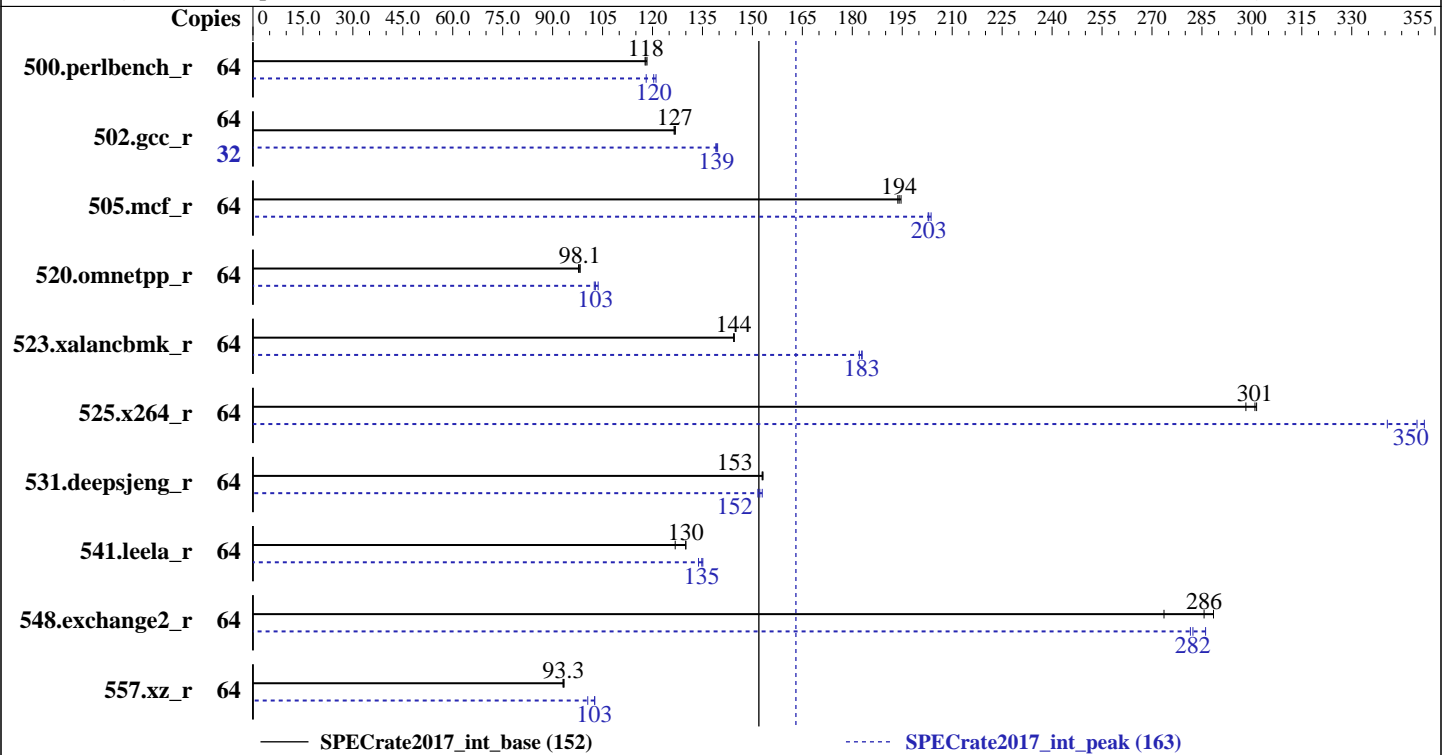
A+ Server 2023US-TR4
(H11DSU-iN , AMD EPYC 7281)

SPECrate2017_int_base = 152

SPECrate2017_int_peak = 163

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 7281
 Max MHz.: 2700
 Nominal: 2100
 Enabled: 32 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, 4 MB shared / 2 cores
 Other: None
 Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2666V-L)
 Storage: 1 x 500 GB SATAIII, 7200 RPM
 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 1.1 released Feb-2018
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-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
500.perlbench_r	64	865	118	863	118	861	118	64	847	120	842	121	863	118
502.gcc_r	64	717	126	714	127	715	127	32	326	139	325	139	325	140
505.mcf_r	64	531	195	534	194	533	194	64	508	204	510	203	510	203
520.omnetpp_r	64	859	97.8	856	98.1	855	98.3	64	819	103	810	104	816	103
523.xalancbmk_r	64	468	145	468	144	468	144	64	371	182	370	183	369	183
525.x264_r	64	372	301	372	301	376	298	64	319	352	321	350	329	341
531.deepsjeng_r	64	479	153	479	153	480	153	64	480	153	484	152	482	152
541.leela_r	64	815	130	815	130	836	127	64	784	135	792	134	786	135
548.exchange2_r	64	587	286	613	274	581	288	64	594	282	596	282	586	286
557.xz_r	64	740	93.4	741	93.3	742	93.1	64	687	101	674	103	673	103

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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:26"

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 2²¹ = 2MiB.

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-769d Tue May 15 15:09:09 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 7281 16-Core Processor
2 "physical id"s (chips)

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Platform Notes (Continued)

64 "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 : 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:              4199.69
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
```

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Platform Notes (Continued)

flushbyasid decodeassists pausefilter pfthreshold vmmcall avic fsgsbase bmil 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 1 2 3 32 33 34 35
node 0 size: 128846 MB
node 0 free: 128707 MB
node 1 cpus: 4 5 6 7 36 37 38 39
node 1 size: 129021 MB
node 1 free: 128878 MB
node 2 cpus: 8 9 10 11 40 41 42 43
node 2 size: 129021 MB
node 2 free: 128880 MB
node 3 cpus: 12 13 14 15 44 45 46 47
node 3 size: 129021 MB
node 3 free: 128897 MB
node 4 cpus: 16 17 18 19 48 49 50 51
node 4 size: 129021 MB
node 4 free: 128915 MB
node 5 cpus: 20 21 22 23 52 53 54 55
node 5 size: 129021 MB
node 5 free: 128926 MB
node 6 cpus: 24 25 26 27 56 57 58 59
node 6 size: 129021 MB
node 6 free: 128927 MB
node 7 cpus: 28 29 30 31 60 61 62 63
node 7 size: 129019 MB
node 7 free: 128926 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: 1056761176 kB
```

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Platform Notes (Continued)

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-769d 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

run-level 3 May 15 14:51

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	422G	25G	397G	6%	/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. 1.1 02/07/2018

Memory:

16x NO DIMM NO DIMM
16x Samsung M386A8K40BM2-CTD 64 GB 4 rank 2667

(End of data from sysinfo program)

Compiler Version Notes

=====
CC 502.gcc_r(peak)
=====

AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM

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Compiler Version Notes (Continued)

AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin

=====
CXXC 523.xalancbmk_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin

=====
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base) 557.xz_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 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base,
peak) 541.leela_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 500.perlbench_r(peak) 525.x264_r(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

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Compiler Version Notes (Continued)

=====
CXXC 541.leela_r(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
=====

=====
FC 548.exchange2_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
=====

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
clang gfortran

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64

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Base Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64
557.xz_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 -Ofast -fdefault-integer-8  
-fplugin=dragonegg.so -fplugin-arg-dragonegg-llvm-option="  
-enable-iv-split -inline-threshold:1000 -disable-vect-cmp" -ljemalloc  
-lgfortran -lamdlibm
```

Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

clang gfortran

Peak Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64

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Peak Portability Flags (Continued)

```
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -D_FILE_OFFSET_BITS=64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -flto -Wl, -plugin-opt= -merge-constant
-lsr-in-nested-loop -fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver1
-fstruct-layout=3 -mllvm -vectorize-memory-aggressively
-mno-avx2 -unroll-threshold=100 -fremap-arrays
-inline-threshold=1000 -ljemalloc
```

```
502.gcc_r: -m32 -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 -fgnu89-inline
-L/root/work/lib/jemalloc/lib32 -ljemalloc
```

```
505.mcf_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 -ljemalloc
```

525.x264_r: Same as 500.perlbench_r

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

```
520.omnetpp_r: -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)

```
523.xalancbmk_r: -m32 -flto -Wl, -plugin-opt= -merge-constant  
-lsr-in-nested-loop -Ofast -march=znver1  
-finline-aggressive -mllvm -unroll-threshold=100  
-fremap-arrays -inline-threshold=1000  
-L/root/work/lib/jemalloc/lib32 -ljemalloc
```

531.deepsjeng_r: Same as 520.omnetpp_r

```
541.leela_r: -flto -Wl, -plugin-opt= -merge-constant  
-lsr-in-nested-loop -fprofile-instr-generate(pass 1)  
-fprofile-instr-use(pass 2) -Ofast -march=znver1 -mllvm  
-unroll-count=8 -unroll-threshold=100 -ljemalloc
```

Fortran benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-O3(gfortran) -O3(clang) -mavx2 -madx -funroll-loops -ffast-math  
-Ofast -fdefault-integer-8 -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=" -enable-iv-split  
-inline-threshold:1000 -disable-vect-cmp" -ljemalloc -lgfortran  
-lamdlibm
```

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/aocc100-flags-revC-I.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/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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2018-05-15 03:09:08-0400.

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