SPEC CPU®2017 Integer Rate Result

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Fujitsu

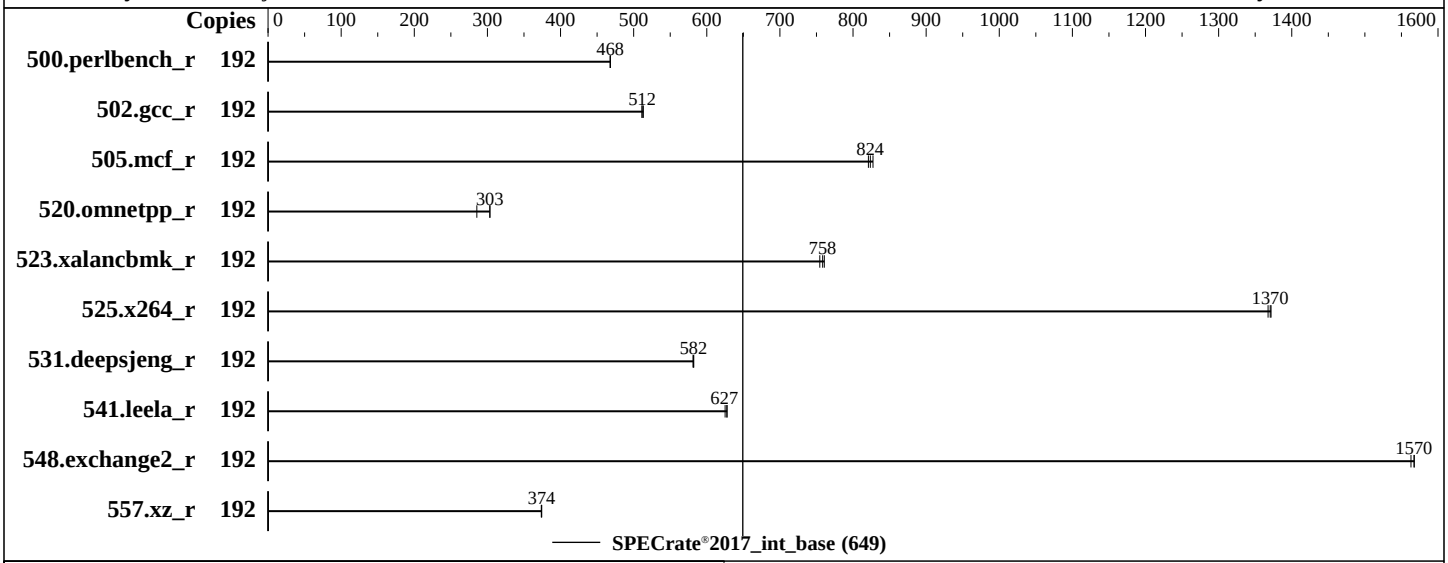
PRIMERGY RX2450 M1, AMD EPYC 7643
2.30 GHz

SPECrate®2017_int_base = 649

SPECrate®2017_int_peak = Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Oct-2021
Hardware Availability: Oct-2021
Software Availability: Mar-2021



Hardware

CPU Name:	AMD EPYC 7643
Max MHz:	3600
Nominal:	2300
Enabled:	96 cores, 2 chips, 2 threads/core
Orderable:	2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	512 KB I+D on chip per core
L3:	256 MB I+D on chip per chip, 32 MB shared / 6 cores
Other:	None
Memory:	2 TB (32 x 64 GB 2Rx4 PC4-3200V-L)
Storage:	1 x PCIe SSD, 2TB
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP2 (x86_64) kernel version 5.3.18-22-default
Compiler:	C/C++/Fortran: Version 3.0.0 of AOCC
Parallel:	No
Firmware:	Fujitsu BIOS Version 2.1.V2 Released Oct-2021
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	jemalloc: jemalloc memory allocator library v5.2.0
Power Management:	BIOS set to prefer performance at the cost of additional power usage

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	192	**653**	**468**	653	468	653	468							
502.gcc_r	192	530	513	532	511	**531**	**512**							
505.mcf_r	192	375	827	378	821	**377**	**824**							
520.omnetpp_r	192	830	303	**831**	**303**	882	286							
523.xalancbmk_r	192	**267**	**758**	267	761	269	755							
525.x264_r	192	**245**	**1370**	245	1370	246	1370							
531.deepsjeng_r	192	378	582	379	581	**378**	**582**							
541.leela_r	192	**507**	**627**	509	625	506	628							
548.exchange2_r	192	321	1570	**321**	**1570**	322	1560							
557.xz_r	192	554	374	555	374	**554**	**374**							

SPECrate®2017_int_base = 649

SPECrate®2017_int_peak = Not Run

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/
```

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 limit
'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>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.
```

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Operating System Notes (Continued)

```
To enable Transparent Hugepages (THP) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/benchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib;/home/be
     nchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.2.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2
```

Platform Notes

```
 BIOS configuration:
 ACPI SRAT L3 Cache As NUMA Domain = Enabled
 APBDIS = 1
 cTDP Control = Manual
 cTDP = 240
 Determinism Slider = Power
 DRAM Scrub Time = Disabled
 EDC Control = Manual
 EDC = 300
 EDC Platform Limit = 300
```

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Platform Notes (Continued)

```
Fix SOC P-state = P0
IOMMU = Enabled
L1 Stream HW Prefetcher = Enabled
L2 Stream HW Prefetcher = Enabled
NUMA Nodes Per Socket = NPS4
Package Power Limit = 240
Package Power Limit Control = Manual
SVM Mode = Disabled
SMT Control = Enabled
xGMI Link Max Speed = 18Gbps

Sysinfo program /home/benchmark/speccpu-milan/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Tue Aug  3 19:03:30 2021

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 7643 48-Core Processor
      2  "physical id"s (chips)
      192 "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 : 48
      siblings  : 96
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
      32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
      32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61

From lscpu from util-linux 2.33.1:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
     Address sizes:       48 bits physical, 48 bits virtual
     CPU(s):              192
     On-line CPU(s) list: 0-191
     Thread(s) per core:  2
     Core(s) per socket:  48
     Socket(s):           2
     NUMA node(s):        16
     Vendor ID:           AuthenticAMD
     CPU family:          25
     Model:               1
     Model name:          AMD EPYC 7643 48-Core Processor
```

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Platform Notes (Continued)

```
      Stepping:              1
      CPU MHz:               1846.422
      CPU max MHz:           2300.0000
      CPU min MHz:           1500.0000
      BogoMIPS:              4599.67
      Virtualization:        AMD-V
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              512K
      L3 cache:              32768K
      NUMA node0 CPU(s):     0-5,96-101
      NUMA node1 CPU(s):     6-11,102-107
      NUMA node2 CPU(s):     12-17,108-113
      NUMA node3 CPU(s):     18-23,114-119
      NUMA node4 CPU(s):     24-29,120-125
      NUMA node5 CPU(s):     30-35,126-131
      NUMA node6 CPU(s):     36-41,132-137
      NUMA node7 CPU(s):     42-47,138-143
      NUMA node8 CPU(s):     48-53,144-149
      NUMA node9 CPU(s):     54-59,150-155
      NUMA node10 CPU(s):    60-65,156-161
      NUMA node11 CPU(s):    66-71,162-167
      NUMA node12 CPU(s):    72-77,168-173
      NUMA node13 CPU(s):    78-83,174-179
      NUMA node14 CPU(s):    84-89,180-185
      NUMA node15 CPU(s):    90-95,186-191
      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 cpuid extd_apicid aperfmperf pni pclmulqdq
      monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand
      lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw
      ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
      cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase
      bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
      xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
      clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
      vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif
      umip pku ospke vaes vpclmulqdq rdpid 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: 16 nodes (0-15)
    node 0 cpus: 0 1 2 3 4 5 96 97 98 99 100 101
    node 0 size: 128752 MB
```

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Platform Notes (Continued)

```
node 0 free: 128299 MB
node 1 cpus: 6 7 8 9 10 11 102 103 104 105 106 107
node 1 size: 129018 MB
node 1 free: 128766 MB
node 2 cpus: 12 13 14 15 16 17 108 109 110 111 112 113
node 2 size: 129020 MB
node 2 free: 128825 MB
node 3 cpus: 18 19 20 21 22 23 114 115 116 117 118 119
node 3 size: 129018 MB
node 3 free: 128829 MB
node 4 cpus: 24 25 26 27 28 29 120 121 122 123 124 125
node 4 size: 129020 MB
node 4 free: 128826 MB
node 5 cpus: 30 31 32 33 34 35 126 127 128 129 130 131
node 5 size: 128985 MB
node 5 free: 128798 MB
node 6 cpus: 36 37 38 39 40 41 132 133 134 135 136 137
node 6 size: 129020 MB
node 6 free: 128825 MB
node 7 cpus: 42 43 44 45 46 47 138 139 140 141 142 143
node 7 size: 129006 MB
node 7 free: 128683 MB
node 8 cpus: 48 49 50 51 52 53 144 145 146 147 148 149
node 8 size: 129020 MB
node 8 free: 128852 MB
node 9 cpus: 54 55 56 57 58 59 150 151 152 153 154 155
node 9 size: 129018 MB
node 9 free: 128864 MB
node 10 cpus: 60 61 62 63 64 65 156 157 158 159 160 161
node 10 size: 129020 MB
node 10 free: 128831 MB
node 11 cpus: 66 67 68 69 70 71 162 163 164 165 166 167
node 11 size: 129018 MB
node 11 free: 128850 MB
node 12 cpus: 72 73 74 75 76 77 168 169 170 171 172 173
node 12 size: 129020 MB
node 12 free: 128836 MB
node 13 cpus: 78 79 80 81 82 83 174 175 176 177 178 179
node 13 size: 129018 MB
node 13 free: 128860 MB
node 14 cpus: 84 85 86 87 88 89 180 181 182 183 184 185
node 14 size: 129020 MB
node 14 free: 128869 MB
node 15 cpus: 90 91 92 93 94 95 186 187 188 189 190 191
node 15 size: 128778 MB
node 15 free: 128633 MB
node distances:
```

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Platform Notes (Continued)

```
  node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
    0:  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
    1:  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
    2:  12  12  10  11  12  12  12  12  32  32  32  32  32  32  32  32
    3:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
    4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
    5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
    6:  12  12  12  12  12  12  10  11  32  32  32  32  32  32  32  32
    7:  12  12  12  12  12  12  11  10  32  32  32  32  32  32  32  32
    8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
    9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
   10:  32  32  32  32  32  32  32  32  12  12  10  11  12  12  12  12
   11:  32  32  32  32  32  32  32  32  12  12  11  10  12  12  12  12
   12:  32  32  32  32  32  32  32  32  12  12  12  12  10  11  12  12
   13:  32  32  32  32  32  32  32  32  12  12  12  12  11  10  12  12
   14:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
   15:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10

From /proc/meminfo
   MemTotal:       2113294716 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
   performance

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP2"
      VERSION_ID="15.2"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
   Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020
   (720aeba/lp-1a956f1) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):                          Not affected
CVE-2018-3620 (L1 Terminal Fault):                       Not affected
Microarchitectural Data Sampling:                        Not affected
CVE-2017-5754 (Meltdown):                                Not affected
```

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Platform Notes (Continued)

```
 CVE-2018-3639 (Speculative Store Bypass):             Mitigation: Speculative Store
                                                       Bypass disabled via prctl and
                                                       seccomp
 CVE-2017-5753 (Spectre variant 1):                    Mitigation: usercopy/swapgs
                                                       barriers and __user pointer
                                                       sanitization
 CVE-2017-5715 (Spectre variant 2):                    Mitigation: Full AMD retpoline,
                                                     IBPB: conditional, IBRS_FW, STIBP:
                                                       always-on, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):              Not affected

 run-level 3 Aug 3 19:01

 SPEC is set to: /home/benchmark/speccpu-milan
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/nvme0n1p3 xfs   1.3T   46G  1.3T   4% /home

 From /sys/devices/virtual/dmi/id
     Vendor:         FUJITSU
     Product:        PRIMERGY RX2450 M1
     Serial:         MACUxxxxxx

 Additional information from dmidecode 3.2 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.
   Memory:
     32x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

 BIOS:
    BIOS Vendor:       American Megatrends Inc.
    BIOS Version:      2.1.V2
    BIOS Date:         08/02/2021
    BIOS Revision:     5.22

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
        | 525.x264_r(base) 557.xz_r(base)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
```

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Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
        | 541.leela_r(base)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

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

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Base Portability Flags (Continued)

523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
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

Base Optimization Flags

C benchmarks:
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm
-ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument

C++ benchmarks:
-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/aocc300-flags-B2.html
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-MILAN-RevB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/aocc300-flags-B2.xml
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-MILAN-RevB.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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