# SPEC CPU®2017 Integer Speed Result

## Dell Inc.

**PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)**

### SPECspeed®2017_int_base = 12.3

### SPECspeed®2017_int_peak = 12.3

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### Hardware

- **CPU Name:** AMD EPYC 7513
- **Max MHz:** 3650
- **Nominal:** 2600
- **Enabled:** 64 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 512 KB I+D on chip per core
- **L3:** 128 MB I+D on chip per chip, 32 MB shared / 8 cores
- **Other:** None
- **Memory:** 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.10.1.el8_3.x86_64
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 2.0.3 released Jan-2021
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc: jemalloc memory allocator library v5.1.0
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
## Dell Inc.

PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)

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### SPECspeed®2017_int_peak = 12.3

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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/

### 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>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'echo 8 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'echo 3 > /proc/sys/kern.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.

(Continued on next page)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)

SPEC CPU®2017 Integer Speed Result

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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

Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations, '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:
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/mnt/ramdisk/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/32;"
MALLOCP_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 602.gcc_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2_s peak run:
GOMP_CPU_AFFINITY = "0"

General Notes

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

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

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.

(Continued on next page)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)

**SPEC CPU®2017 Integer Speed Result**

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

**Test Date:** Mar-2021  
**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

**General Notes (Continued)**

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

**Platform Notes**

**BIOS settings:**
- Logical processor: Disabled
- L3 Cache as NUMA Domain: Enabled
- Virtualization Technology: Disabled
- DRAM Refresh Delay: Performance
- System Profile: Custom
- CPU Power Management: Maximum Performance
- Memory Patrol Scrub: Disabled
- PCI ASPM L1 Link
- Power Management: Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e662d07080afeaa89d4b38e2f1c
running on localhost.localdomain Fri Mar 26 10:12:21 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 7513 32-Core Processor
- 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: 32
  - siblings: 32
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  - physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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: 1

*(Continued on next page)*
## Platform Notes (Continued)

Core(s) per socket:  32  
Socket(s):  2  
NUMA node(s):  8  
Vendor ID:  AuthenticAMD  
CPU family:  25  
Model:  1  
Model name:  AMD EPYC 7513 32-Core Processor  
Stepping:  1  
CPU MHz:  2860.570  
BogoMIPS:  5190.62  
Virtualization:  AMD-V  
L1d cache:  32K  
L1i cache:  32K  
L2 cache:  512K  
L3 cache:  32768K  
NUMA node0 CPU(s):  0-7  
NUMA node1 CPU(s):  8-15  
NUMA node2 CPU(s):  16-23  
NUMA node3 CPU(s):  24-31  
NUMA node4 CPU(s):  32-39  
NUMA node5 CPU(s):  40-47  
NUMA node6 CPU(s):  48-55  
NUMA node7 CPU(s):  56-63  
Flags:  fpu vme de pse tsc msr pae 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 ext_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs kINIT wd tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_13 cdp_13 invpcid_single hw_pstate sme ssbd mba sev iibr ibpb stibp vmcmap fsgsbase bm1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsave xgetbv1 xsaves cqm_llc cqm_occu_p cqm_mbml_total cqm_mbm_local clzero irperf xsaveerprtp wbnoinvvd amd_ppin arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists 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:  8 nodes (0-7)  
node 0 cpus:  0 1 2 3 4 5 6 7  
node 0 size:  257562 MB  
node 0 free:  257464 MB  
node 1 cpus:  8 9 10 11 12 13 14 15  
node 1 size:  258035 MB

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### Platform Notes (Continued)

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From /proc/meminfo

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<tr>
<td>Hugepagesize</td>
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/sbin/tuned-adm active

Current active profile: throughput-performance

From /etc/*release* /etc/*version*

```
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
```
**Dell Inc.**  
**PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)**  

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<td>SPECspeed®2017_int_peak = 12.3</td>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Mar-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

**Platform Notes (Continued)**

```plaintext
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
Linux localhost.localdomain 4.18.0-240.10.1.el8_3.x86_64 #1 SMP Wed Dec 16 03:30:52 EST 2020 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
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, IBFB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Mar 26 05:09 last=5

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use% Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>225G</td>
<td>4.8G</td>
<td>221G</td>
<td>3% /mnt/ramdisk</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R7525
Product Family: PowerEdge
Serial: 48LN333

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.

Memory:
- 16x 802C8632802C 72ASS16G72LZ-3G2B3 128 GB 4 rank 3200
- 16x Not Specified Not Specified

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Dell Inc.

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Platform Notes (Continued)

BIOS:
- BIOS Vendor: Dell Inc.
- BIOS Version: 2.0.3
- BIOS Date: 01/15/2021
- BIOS Revision: 2.0

(End of data from sysinfo program)

Compiler Version Notes

C

| 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak) |

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

C++

| 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak) |

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

| 648.exchange2_s(base, peak) |

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
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.3
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Mar-2021
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Hardware Availability: Jun-2021
Software Availability: Mar-2021

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -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 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -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
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize

(Continued on next page)
# SPEC CPU®2017 Integer Speed Result

## Dell Inc.

**PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)**

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<td>Dell Inc.</td>
<td>Jun-2021</td>
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<tr>
<td>12.3</td>
<td>12.3</td>
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</table>

## Base Optimization Flags (Continued)

- C++ benchmarks (continued):
  - -W1, -mllvm -W1, -align-all-nofallthru-blocks=6
  - -W1, -mllvm -W1, -reduce-array-computations=3 -O3 -march=znver3
  - -fveclib=AMDLIBM -ffast-math -ftol -mllvm -enable-partial-unswitch
  - -mllvm -unroll-threshold=100 -finline-aggressive
  - -fllvm-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 -DSPEC_OPENMP
  - -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
  - -lflangrti

- Fortran benchmarks:
  - -m64 -mno-adx -mno-sse4a -W1, -mllvm -W1, -inline-recursion=4
  - -W1, -mllvm -W1, -lsr-in-nested-loop -W1, -mllvm -W1, -enable-iv-split
  - -W1, -mllvm -W1, -region-vectorize -W1, -mllvm -W1, -function-specialize
  - -W1, -mllvm -W1, -align-all-nofallthru-blocks=6
  - -W1, -mllvm -W1, -reduce-array-computations=3 -O3 -march=znver3
  - -fveclib=AMDLIBM -ffast-math -ftol -z muldefs
  - -mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
  - -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
  - -lflangrti

## Base Other Flags

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

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

- Fortran benchmarks:
  - -Wno-return-type

## Peak Compiler Invocation

- C benchmarks:
  - clang

(Continued on next page)
Peak Compiler Invocation (Continued)

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
600.perlbench_s: basepeak = yes

602.gcc_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=5 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

605.mcf_s: basepeak = yes

625.x264_s: basepeak = yes

657.xz_s: basepeak = yes

C++ benchmarks:
620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-do-block-reorder=aggressive

(Continued on next page)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7513 32-Core Processor)

SPEC CPU®2017 Integer Speed Result

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Hardware Availability: Jun-2021
Software Availability: Mar-2021

Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):
- Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math -flto
- finline-aggressive -mllvm -unroll-threshold=100
- flv-function-specialization -mllvm -enable-licm-vrp
- mllvm -reorder-loops -mllvm -aggressive-loop-unswitch
- mllvm -reduce-array-computations=3
- mllvm -global-vectorize-slp=true
- mllvm -do-block-reorder=aggressive
- fvirtual-function-elimination -fvisibility=hidden
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -ldmlibm
- ljemalloc -lflang

631.deepsjeng_s: basepeak = yes

641.leela_s: Same as 623.xalancbmk_s

Fortran benchmarks:
- m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-inline-recursion=4
- Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
- Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -mllvm -unroll-aggressive
- mllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -fopenmp=libomp
- lomp -ldmlibm -ljemalloc -lflang

Peak Other Flags

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

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

Fortran benchmarks:
- Wno-return-type

The flags files that were used to format this result can be browsed at
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You can also download the XML flags sources by saving the following links:


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Tested with SPEC CPU®2017 v1.1.5 on 2021-03-26 11:12:21-0400.
Originally published on 2021-05-25.