# SPEC CPU®2017 Integer Speed Result

**Dell Inc.**  
**PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)**  

**SPECspeed®2017_int_base = 12.3**  
**SPECspeed®2017_int_peak = 12.2**

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** May-2021  
**Hardware Availability:** Apr-2021  
**Software Availability:** Mar-2021

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<td>Parallel:</td>
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<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library v5.1.0</td>
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<td>Power Management:</td>
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</table>

**Hardware**

- **CPU Name:** AMD EPYC 7513  
- **Max MHz:** 3650  
- **Nominal:** 2600  
- **Enabled:** 32 cores, 1 chip  
- **Orderable:** 1 chip  
- **L1 Cache:** 32 KB I + 32 KB D on chip per core  
- **L2 Cache:** 512 KB I+D on chip per core  
- **L3 Cache:** 128 MB I+D on chip per chip, 32 MB shared / 8 cores  
- **Other:** None  
- **Memory:** 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)  
- **Storage:** 256 GB on tmpfs  
- **Other:** None
Results Table

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</table>

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.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.

(Continued on next page)
Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'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:
GOMP_CPU_AFFINITY = "0-31"
LD_LIBRARY_PATH =
    "/mnt/ramdisk/cpu2017-1.1.7-aocc300/amd_speed_aocc300_milan_B_lib/64;/mnt/
    ramdisk/cpu2017-1.1.7-aocc300/amd_speed_aocc300_milan_B_lib/32:");
MALLOCCONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "32"

Environment variables set by runcpu during the 600.perlbench_s peak run:
GOMP_CPU_AFFINITY = "0"

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

Environment variables set by runcpu during the 605.mcf_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 620.omnetpp_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 625.x264_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 631.deepsjeng_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"

(Continued on next page)
Environment Variables Notes (Continued)

Environment variables set by runcpu during the 657.xz_s peak run:
GOMP_CPU_AFFINITY = "0-31"

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 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Benchmark run from a 256 GB ramdisk created with the cmd: "mount -t tmpfs -o size=256G 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/cpu2017-1.1.7-aocc300/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on rhel-8-3-amd Tue May  4 09:24:39 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

(Continued on next page)
Dell Inc.

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.2

Platform Notes (Continued)

1 "physical id"s (chips)
32 "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

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: 1
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7513 32-Core Processor
Stepping: 1
CPU MHz: 2402.677
BogoMIPS: 5189.89
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
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 extd_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 ibrk s-info wdt tce topext perfctr_core perfctr_nb bapext perfctr_lmb mwaitx cmpnb mbx_host mret_vm mpx vmx nonmaskable陷阱 interrupt pclmulqdq dtes64ilogp div0 exception trapping svm everest bmi1 bmi2 invpcid cmov stibp bmi2 mwait xsaveopt xsave xstate arch_capabilities

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc. PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.2

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test by: Dell Inc.
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Software Availability: Mar-2021

Platform Notes (Continued)

/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: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3 4 5 6 7
  node 0 size: 257610 MB
  node 0 free: 257273 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 258041 MB
  node 1 free: 257619 MB
  node 2 cpus: 16 17 18 19 20 21 22 23
  node 2 size: 258031 MB
  node 2 free: 254004 MB
  node 3 cpus: 24 25 26 27 28 29 30 31
  node 3 size: 245886 MB
  node 3 free: 245648 MB
  node distances:
    node   0   1   2   3
    0:   10  11  11  11
    1:   11  10  11  11
    2:   11  11  10  11
    3:   11  11  11  10

From /proc/meminfo
  MemTotal:       1044069696 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB
  /sbin/tuned-adm active
    Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.3 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    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

(Continued on next page)
Dell Inc. PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.2

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

**SPEC CPU®2017 Integer Speed Result**

**Platform Notes (Continued)**

uname -a:
Linux rhel-8-3-amd 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020 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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBF: disabled, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 May 4 08:42

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-aocc300

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R6515
Product Family: PowerEdge
Serial: HTDRG13

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 SMI BIOS" standard.

Memory:
8x 802C8632802C 72ASS16G72LZ-3G2B3 128 GB 4 rank 3200
8x Not Specified Not Specified

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 2.2.4
BIOS Date: 04/12/2021

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

**Dell Inc.**

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 12.3</th>
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<tr>
<td>SPECspeed®2017_int_peak = 12.2</td>
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- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Test Date:** May-2021
- **Hardware Availability:** Apr-2021
- **Tested by:** Dell Inc.
- **Software Availability:** Mar-2021

## Platform Notes (Continued)

- **BIOS Revision:** 2.2

(End of data from sysinfo program)

## Compiler Version Notes

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<td>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)</td>
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</tbody>
</table>

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

<table>
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<th>C++ benchmarks</th>
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<td>620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)</td>
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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

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<td>648.exchange2_s(base, peak)</td>
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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++

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
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Dell Inc.  
PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)  

SPECspeed®2017_int_base = 12.3  
SPECspeed®2017_int_peak = 12.2

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

Test Date: May-2021  
Hardware Availability: Apr-2021  
Software Availability: Mar-2021

Base Compiler Invocation (Continued)

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 -O3 -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
-Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6
-Wl, -mllvm -Wl, -reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-ffunction-specialization -mlir -loop-unswitch-threshold=200000
-mlir -reroll-loops -mlir -aggressive-loop-unswitch
-mlir -extra-vectorizer-passes -mlir -reduce-array-computations=3
-mlir -global-vectorize-slp=true -mlir -convert-pow-exp-to-int=false
-z muldefs -mlir -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 -Wl,-mlir -Wl,-inline-recursion=4
-Wl,-mlir -Wl,-lsr-in-nested-loop -Wl,-mlir -Wl,-enable-iv-split
-Wl,-mlir -Wl,-region-vectorize -Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlir -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -z muldefs
-mlir -unroll-aggressive -mlir -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

C++ benchmarks:
clang++

Fortran benchmarks:
flang
SPEC CPU®2017 Integer Speed Result

Dell Inc.
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Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

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

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mlllvm -Wl,-do-block-reorder=aggressive
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -finline-aggressive
-mlllvm -unroll-threshold=100 -flv-function-specialization
-mlllvm -enable-licm-vrp -mlllvm -reroll-loops
-mlllvm -aggressive-loop-unswitch -mlllvm -reduce-array-computations=3
-mlllvm -global-vectorize-slp=true -mlllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llflang

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mlllvm -Wl,-inline-recursion=4
-Wl,-mlllvm -Wl,-lsr-in-nested-loop -Wl,-mlllvm -Wl,-enable-iv-split
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mlllvm -unroll-aggressive
-mlllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lamdlibm -ljemalloc -llflang
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

<table>
<thead>
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| CPU2017 License: 55      | Test Date: May-2021 |
| Test Sponsor: Dell Inc.  | Hardware Availability: Apr-2021 |
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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

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