## Dell Inc.

**PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)**

<table>
<thead>
<tr>
<th>SPECspeed&lt;sup&gt;2017_int_base&lt;/sup&gt; = 12.3</th>
<th>SPECspeed&lt;sup&gt;2017_int_peak&lt;/sup&gt; = 12.3</th>
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<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: May-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Jun-2021</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Mar-2021</td>
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### Threads

<table>
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<tr>
<th>SPECspeed&lt;sup&gt;2017_int_base&lt;/sup&gt; (12.3)</th>
<th>SPECspeed&lt;sup&gt;2017_int_peak&lt;/sup&gt; (12.3)</th>
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<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed&lt;sup&gt;2017_int_base&lt;/sup&gt;</th>
<th>SPECspeed&lt;sup&gt;2017_int_peak&lt;/sup&gt;</th>
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<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>7.27</td>
<td>13.2</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>32</td>
<td>13.3</td>
<td>20.4</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>32</td>
<td>8.13</td>
<td>20.5</td>
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<td>620.omnetpp_s</td>
<td>32</td>
<td>8.14</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>32</td>
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<tr>
<td>625.x264_s</td>
<td>32</td>
<td>17.0</td>
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<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
<td>32</td>
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<td>648.exchange2_s</td>
<td>32</td>
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</tr>
<tr>
<td>657.xz_s</td>
<td>32</td>
<td>23.7</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** AMD EPYC 7513
- **Max MHz:** 3650
- **Nominal:** 2600
- **Enabled:** 32 cores, 1 chip
- **Orderable:** 1 chip
- **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:** 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)
- **Storage:** 125 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 2.2.4 released Apr-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.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
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<th>Peak Ratio</th>
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<td>657.xz_s</td>
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**SPECspeed®2017_int_base = 12.3**

**SPECspeed®2017_int_peak = 12.3**

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)
Dell Inc.

PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

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

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:"
MALLOCONF = "retain: true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "32"

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 625.x264_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 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

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:

(Continued on next page)
Dell Inc. PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

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

General Notes (Continued)

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.
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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G 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 Thu May 6 08:45:10 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
  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

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

**Dell Inc.**

PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

**SPECspeed®2017_int_base = 12.3**

**SPECspeed®2017_int_peak = 12.3**

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**Platform Notes (Continued)**

- **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:** 2932.466
- **BogoMIPS:** 5190.15
- **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 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 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topopt perfrctr_core perfctr_nb mpext perfctr_lld mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate sme ssbd mba sev ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveerptr wbnoinvd amd_pfnat arat npt lbrv svm_lock nrrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold v_vm save_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_reco v 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:** 4 nodes (0-3)
  - node 0 cpus: 0 1 2 3 4 5 6 7
  - node 0 size: 257470 MB
  - node 0 free: 253495 MB
  - node 1 cpus: 8 9 10 11 12 13 14 15

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

Dell Inc.

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SPEC®2017_int_base = 12.3

SPEC®2017_int_peak = 12.3

CPU2017 License: 55
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Platform Notes (Continued)

node 1 size: 258001 MB
node 1 free: 257618 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 257984 MB
node 2 free: 257788 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 245902 MB
node 3 free: 245609 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: 1043940636 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/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"
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

uname -a:
Linux rhel-8-3-amd 4.18.0-240.22.1.el8_3.x86_64 #1 SMP Thu Mar 25 14:36:04 EDT 2021
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

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

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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: disabled, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling):
Not affected
CVE-2019-11135 (TSX Asynchronous Abort):
Not affected

run-level 3 Nov 26 09:52
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-aocc300
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  125G  3.7G  122G   3% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:        Dell Inc.
Product:       PowerEdge R7515
Product Family: PowerEdge
Serial:        5MGPH13

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:
  8x 80CE80B380CE M386AAG40AM3-CWE 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
  BIOS Revision: 2.2

(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)
==============================================================================

(Continued on next page)
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Compiler Version Notes (Continued)
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
600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64

(Continued on next page)
Dell Inc. PowerEdge R7515 (AMD EPYC 7513 32-Core Processor) SPECspeed®2017_int_base = 12.3
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Base Portability Flags (Continued)

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 -W1,-allow-multiple-definition
-W1,-mllvm -W1,-enable-licm-vrp -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 -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
-llflang -llflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-do-block-reorder=aggressive
-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 -flto -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroil-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 -llflang
-llflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-mllvm -W1,-inline-recursion=4

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

**Dell Inc.**

PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

<table>
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<tr>
<th>SPECspeed®2017_int_base = 12.3</th>
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### Base Optimization Flags (Continued)

For Fortran benchmarks (continued):

- `-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split`
- `-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 -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`

- **C++ benchmarks:**
  - `clang++`

- **Fortran benchmarks:**
  - `flang`

### Peak Portability Flags

Same as Base Portability Flags
Dell Inc. PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

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Peak Optimization Flags

C benchmarks:

600.perlbmk_s: basepeak = yes


fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

605.mcf_s: Same as 602.gcc_s

625.x264_s: Same as 602.gcc_s

657.xz_s: Same as 602.gcc_s

C++ benchmarks:


623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

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

**Dell Inc.**

PowerEdge R7515 (AMD EPYC 7513 32-Core Processor)

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**Peak Optimization Flags (Continued)**

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:

648.exchange2_s: basepeak = yes

**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:


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