Dell Inc.

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

**SPEC CPU®2017 Floating Point Speed Result**

<table>
<thead>
<tr>
<th>Tests</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>bwaves_s</td>
<td>172</td>
<td>172</td>
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<tr>
<td>cactuBSSN_s</td>
<td>174</td>
<td>174</td>
</tr>
<tr>
<td>ibm_s</td>
<td>99.4</td>
<td>101</td>
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<tr>
<td>wrf_s</td>
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<td>249</td>
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<tr>
<td>cam4_s</td>
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<tr>
<td>pop2_s</td>
<td>249</td>
<td>249</td>
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<tr>
<td>imagick_s</td>
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<tr>
<td>nab_s</td>
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<tr>
<td>fotnik3d_s</td>
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</tr>
<tr>
<td>roms_s</td>
<td>146</td>
<td>146</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 core, 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

**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.
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_fp_base = 144
SPECspeed®2017_fp_peak = 143

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

Results Table

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<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<td>74.3</td>
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<td>638.imagick_s</td>
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<td>32</td>
<td>108</td>
<td>146</td>
<td>108</td>
</tr>
</tbody>
</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 -1 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 R6515 (AMD EPYC 7513 32-Core Processor)

SPEC CPU®2017 Floating Point Speed Result

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SPECspeed®2017_fp_base = 144
SPECspeed®2017_fp_peak = 143

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.
To enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' 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;"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "32"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26"
Environment Variables Notes (Continued)

11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26
11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-31"
PGHPF_ZMEM = "yes"

Environment variables set by runcpu during the 654.roms_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 : Disabled
    Power Management : Disabled
**SPEC CPU®2017 Floating Point Speed Result**

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

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<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
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<tbody>
<tr>
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**CPU2017 License:** 55  
**Test Date:** May-2021  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Hardware Availability:** Apr-2021  
**Software Availability:** Mar-2021

**Platform Notes (Continued)**

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 11:57:38 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
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: 2037.940
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 mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
```

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

**Dell Inc.**

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

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

**Test Date:** May-2021

**Hardware Availability:** Apr-2021

**Software Availability:** Mar-2021

### Platform Notes (Continued)

constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmpref pni pclmulqdq
monitor ssse3 fma cx16 pcl 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 topoext perfctr_core perfctr_nb bpext perfctr_llc 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 xsave xgetbv1 xsave cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat npt lbv svm_lock
nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
v_vmsave_vmload vg1f umip pku ospke vaes vpclmulqdq rdpid overflow_recover succor smca

```
/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: 257264 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 258041 MB
node 1 free: 257687 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 258031 MB
node 2 free: 253912 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 245886 MB
node 3 free: 245647 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"
```

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

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Dell Inc.</td>
<td>Mar-2021</td>
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</tbody>
</table>

### Platform Notes (Continued)

```
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.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020 x86_64
ox86_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, 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 May 4 08:42**

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

<table>
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<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>256G</td>
<td>3.7G</td>
<td>253G</td>
<td>2%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

**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
Dell Inc.

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

**SPEC CPU®2017 Floating Point Speed Result**

**SPECspeed®2017_fp_base = 144**

**SPECspeed®2017_fp_peak = 143**

---

**Platform Notes (Continued)**

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

BIOS:

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<th>Dell Inc.</th>
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<td>BIOS Version</td>
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<tr>
<td>BIOS Date</td>
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<tr>
<td>BIOS Revision</td>
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</table>

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
C
  619.lbm_s(base, peak) 638.imagick_s(base, peak)
  644.nab_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++, C, Fortran
  607.cactuBSSN_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
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
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

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

SPECspeed®2017_fp_base = 144
SPECspeed®2017_fp_peak = 143

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

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

Compiler Version Notes (Continued)

Fortran
  603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
  654.roms_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, C
  621.wrf_s(base, peak) 627.cam4_s(base, peak)
  628.pop2_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
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Base Compiler Invocation

C benchmarks:
  clang

Fortran benchmarks:
  flang

Benchmarks using both Fortran and C:
  flang clang

Benchmarks using Fortran, C, and C++:
  clang++ clang flang
SPEC CPU®2017 Floating Point Speed Result

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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.libm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -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

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Hz,1,0x1 -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -ljemalloc -ljemalloc -lflang -lflangrti

Benchmarks using both Fortran and C:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

(Continued on next page)
Dell Inc.

PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

**SPEC CPU®2017 Floating Point Speed Result**

<table>
<thead>
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**Base Optimization Flags (Continued)**

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<tr>
<td>-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=zvner3</td>
</tr>
<tr>
<td>-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5</td>
</tr>
<tr>
<td>-m1llvm -unroll-threshold=50 -mllvm -inline-threshold=1000</td>
</tr>
<tr>
<td>-fremap-arrays -mllvm -function-specialize -flv-function-specialization</td>
</tr>
<tr>
<td>-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true</td>
</tr>
<tr>
<td>-mllvm -enable-licm-VRP -mllvm -reduce-array-computations=3 -Hz,1,0x1</td>
</tr>
<tr>
<td>-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops</td>
</tr>
<tr>
<td>-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs</td>
</tr>
<tr>
<td>-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc</td>
</tr>
<tr>
<td>-lflang -lflangrti</td>
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</tbody>
</table>

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**Base Other Flags**

**C benchmarks:**

-Wno-unused-command-line-argument -Wno-return-type

**Fortran benchmarks:**

-Wno-unused-command-line-argument -Wno-return-type

**Benchmarks using both Fortran and C:**

-Wno-unused-command-line-argument -Wno-return-type

**Benchmarks using Fortran, C, and C++:**

-Wno-unused-command-line-argument -Wno-return-type
Dell Inc. PowerEdge R6515 (AMD EPYC 7513 32-Core Processor)

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**Peak Compiler Invocation**

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:

619.lbm_s: -m64 -mno-adx -mno-sse4a
-W1,-ml1vm -W1,-function-specialize
-W1,-ml1vm -W1,-align-all-nofallthru-blocks=6
-W1,-ml1vm -W1,-reduce-array-computations=3 -0fast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flito
-fstruct-layout=5 -ml1vm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-ml1vm -inline-threshold=1000 -ml1vm -enable-gvn-hoist
-ml1vm -global-vectorize-slp=true
-ml1vm -function-specialize -ml1vm -enable-licm-vrp
-ml1vm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -landlibm -ljemalloc -lflang

638.imagick_s: Same as 619.lbm_s

644.nab_s: -m64 -mno-adx -mno-sse4a -W1,-ml1vm -W1,-region-vectorize
-W1,-ml1vm -W1,-function-specialize -0fast -march=znver3
-fveclib=AMDLIBM -ffast-math -flito -fstruct-layout=5
-ml1vm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -ml1vm -inline-threshold=1000
-ml1vm -enable-gvn-hoist -ml1vm -global-vectorize-slp=true
-ml1vm -function-specialize -ml1vm -enable-licm-vrp

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### Peak Optimization Flags (Continued)

644.nab_s (continued):
```
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:

603.bwaves_s: -m64 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-enable-X86-prefetching
-W1,-mllvm -W1,-enable-licm-vrp
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp =fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

649.fotonik3d_s: -m64 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-enable-X86-prefetching
-W1,-mllvm -W1,-enable-licm-vrp
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-Mrecursive -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp =fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-enable-X86-prefetching
-W1,-mllvm -W1,-enable-licm-vrp
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=5 -mllvm -unroll-threshold=50
-flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp

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Peak Optimization Flags (Continued)

621.wrf_s (continued):
-mlirv -reduce-array-computations=3 -Hz,1,0x1 -O3
-Mrecursive -mlirv -fuse-tile-inner-loop -funroll-loops
-mlirv -extra-vectorizer-passes -mlirv -lsr-in-nested-loop
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

627.cam4_s: -m64 -mno-adx -mno-sse4a
-Wl,-mlirv -Wl,-enable-X86-prefetching
-Wl,-mlirv -Wl,-enable-licm-vrp
-Wl,-mlirv -Wl,-function-specialize
-Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=5 -mlirv -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mlirv -inline-threshold=1000 -mlirv -enable-gvn-hoist
-mlirv -global-vectorize-slp=true
-mlirv -function-specialize -mlirv -enable-licm-vrp
-mlirv -reduce-array-computations=3 -Mrecursive
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

628.pop2_s: Same as 627.cam4_s

Benchmarks using Fortran, C, and C++:
-m64 -mno-adx -mno-sse4a -std=c++98
-Wl,-mlirv -Wl,-x86-use-vzeroupper=false -Wl,-mlirv -Wl,-enable-licm-vrp
-Wl,-mlirv -Wl,-function-specialize
-Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlirv -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mlirv -inline-threshold=1000 -mlirv -enable-gvn-hoist
-mlirv -global-vectorize-slp=true -mlirv -function-specialize
-mlirv -enable-licm-vrp -mlirv -reduce-array-computations=3
-finline-aggressive -mlirv -unroll-threshold=100 -mlirv -reroll-loops
-mlirv -aggressive-loop-unsch -Mrecursive -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Peak Other Flags

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

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

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### Peak Other Flags (Continued)

- **Fortran benchmarks:**  
  - `-Wno-unused-command-line-argument`  
  - `-Wno-return-type`

- **Benchmarks using both Fortran and C:**  
  - `-Wno-unused-command-line-argument`  
  - `-Wno-return-type`

- **Benchmarks using Fortran, C, and C++:**  
  - `-Wno-unused-command-line-argument`  
  - `-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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