**Dell Inc.**

PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Dec-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2022</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2022</td>
</tr>
</tbody>
</table>

| SPECspeed®2017_int_base = 16.2 |
| SPECspeed®2017_int_peak = Not Run |

| CPU2017 License: | 6573 |
| Test Sponsor: | Dell Inc. |
| Tested by: | Dell Inc. |

### Hardware

- **CPU Name:** AMD EPYC 9174F
- **Max MHz:** 4400
- **Nominal:** 4100
- **Enabled:** 16 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 256 MB I+D on chip per core, 32 MB shared / 2 cores
- **Other:** None
- **Memory:** 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)
- **Storage:** 125 GB on tmpfs
- **Other:** None

### Software

- **OS:** Ubuntu 22.04.1 LTS 5.15.0-46-generic
- **Compiler:** C/C++/Fortran: Version 4.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 1.1.0 released Nov-2022
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

---

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>16</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>16</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>16</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>16</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>16</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>16</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
</tr>
</tbody>
</table>

---

**SPECspeed®2017_int_base** (16.2)
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>178</td>
<td>9.97</td>
<td>180</td>
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<tr>
<td>602.gcc_s</td>
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<td>238</td>
<td>16.8</td>
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<td>16.7</td>
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<tr>
<td>605.mcf_s</td>
<td>16</td>
<td>201</td>
<td>23.5</td>
<td>202</td>
<td>23.4</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>137</td>
<td>11.9</td>
<td>137</td>
<td>11.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>16</td>
<td>63.1</td>
<td>22.4</td>
<td>62.9</td>
<td>22.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>16</td>
<td>69.9</td>
<td>25.3</td>
<td>69.7</td>
<td>25.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
<td>178</td>
<td>8.05</td>
<td>179</td>
<td>8.03</td>
<td></td>
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<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td>97.9</td>
<td>30.0</td>
<td>97.8</td>
<td>30.1</td>
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</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
<td>218</td>
<td>28.3</td>
<td>217</td>
<td>28.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECspeed²017_int_base = 16.2**

**SPECspeed²017_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.

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

Dell Inc.  
PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)  

<table>
<thead>
<tr>
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<td>Not Run</td>
</tr>
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**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 = "0-15"
- LD_LIBRARY_PATH = 
  
  
  /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/amd_speed_aocc400_genoa_B_lib/lib:

- LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
- MALLOC_CONF = "oversize_threshold:0,retain:true"
- OMP_DYNAMIC = "false"
- OMP_SCHEDULE = "static"
- OMP_STACKSIZE = "128M"
- OMP_THREAD_LIMIT = "16"

**General Notes**

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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:

- DRAM Refresh Delay : Performance
- DIMM Self Healing on
- Uncorrectable Memory Error : Disabled
- Logical Processor : Disabled
- Virtualization Technology : Disabled
- NUMA Nodes per Socket : 4
- L3 Cache as NUMA Domain : Enabled

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

**Dell Inc.**

PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)

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**CPU2017 License:** 6573  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

| Test Date: | Dec-2022  
| Hardware Availability: | Dec-2022  
| Software Availability: | Nov-2022 |

**Platform Notes (Continued)**

- **System Profile:** Custom  
- **C-States:** Disabled  
- **Memory Patrol Scrub:** Disabled  
- **PCI ASPM L1 Link:**  
- **Power Management:** Disabled  
- **Determinism Slider:** Power Determinism  
- **Algorithm Performance:**  
  - **Boost Disable (ApbDis):** Enabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d  
running on amd-sut Wed Dec 7 08:42:00 2022

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 9174F 16-Core Processor  
1 "physical id"s (chips)  
16 "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 : 16  
siblings : 16
physical 0: cores 0 1 16 17 32 33 48 49 64 65 80 81 96 97 112 113
```

From lscpu from util-linux 2.37.2:

```
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Address sizes: 52 bits physical, 57 bits virtual  
Byte Order: Little Endian  
CPU(s): 16  
On-line CPU(s) list: 0-15  
Vendor ID: AuthenticAMD  
Model name: AMD EPYC 9174F 16-Core Processor  
CPU family: 25  
Model: 17  
Thread(s) per core: 1  
Core(s) per socket: 16  
Socket(s): 1  
Stepping: 1  
Frequency boost: enabled  
CPU max MHz: 4409.0000  
CPU min MHz: 400.0000  
BogoMIPS: 8202.59
```

(Continued on next page)
Dell Inc. PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

SPECspeed®2017_int_base = 16.2
SPECspeed®2017_int_peak = Not Run

Test Date: Dec-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
fppe mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpes gb rdtscp lm constant_tsc rep_good nonstop_tsc cpuid extd_apicid
aperfmpref rapl 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 topoext perfctr_core perfctr_nb
bext perfctr_l1c mwaitx cpb cat_l3 cdpl3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmccall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cmc rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_si avx512bw
avx512vl xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local avx512_bf16 clzero irperf xsaverpr purgepr rdpru wbnoinvd amd_ppin cppc arat
ntlb lbrv svmlock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist
pausefilter pfthreshold avic v_vmsave_vmload vgic v_spec_ctrl1 avx512vbmi umip pkus
ospe avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
la57 rdpid overflow_recover succor smca fsrcm flush_l1d

Virtualization: AMD-V

L1d cache: 512 KiB (16 instances)
L1i cache: 512 KiB (16 instances)
L2 cache: 16 MiB (16 instances)
L3 cache: 256 MiB (8 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0,1
NUMA node1 CPU(s): 2,3
NUMA node2 CPU(s): 4,5
NUMA node3 CPU(s): 6,7
NUMA node4 CPU(s): 8,9
NUMA node5 CPU(s): 10,11
NUMA node6 CPU(s): 12,13
NUMA node7 CPU(s): 14,15

Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user
pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW,
STIBP disabled, RSBB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 512K 8 Data 1 64 1 64

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

Dell Inc.

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SPECspeed®2017_int_peak = Not Run

CPU2017 License: 6573  
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Test Date: Dec-2022  
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Software Availability: Nov-2022

Platform Notes (Continued)

<p>| | | | | | | |</p>
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<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L1i</td>
<td>32K</td>
<td>512K</td>
<td>8 Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
</tr>
<tr>
<td>L2</td>
<td>1M</td>
<td>16M</td>
<td>8 Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>256M</td>
<td>16 Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

```
cache size : 1024 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
node 0 size: 96313 MB
node 0 free: 96100 MB
node 1 cpus: 8 9
node 1 size: 96766 MB
node 1 free: 96566 MB
node 2 cpus: 4 5
node 2 size: 96767 MB
node 2 free: 94901 MB
node 3 cpus: 12 13
node 3 size: 96766 MB
node 3 free: 96657 MB
node 4 cpus: 6 7
node 4 size: 96767 MB
node 4 free: 95868 MB
node 5 cpus: 14 15
node 5 size: 96766 MB
node 5 free: 95108 MB
node 6 cpus: 2 3
node 6 size: 96731 MB
node 6 free: 96490 MB
node 7 cpus: 10 11
node 7 size: 96730 MB
node 7 free: 96478 MB
```

node distances:

```
node   0   1   2   3   4   5   6   7
0:  10  11  12  12  12  12  12  12
1:  11  10  12  12  12  12  12  12
2:  12  10  11  12  12  12  12  12
3:  12  12  11  10  12  12  12  12
4:  12  12  12  12  10  11  12  12
5:  12  12  12  12  11  10  12  12
6:  12  12  12  12  12  12  10  11
7:  12  12  12  12  12  12  11  10
```

From /proc/meminfo

```
MemTotal:    792175704 kB
```

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

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CPU2017 License: 6573
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Platform Notes (Continued)

HugePages_Total:       0
Hugepagesize:       2048 kB

/sbin/tuned-adm active
    Current active profile: latency-performance

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

/usr/bin/lsb_release -d
    Ubuntu 22.04.1 LTS
From /etc/*release* /etc/*version*
    debian_version: bookworm/sid
    os-release:
        PRETTY_NAME="Ubuntu 22.04.1 LTS"
        NAME="Ubuntu"
        VERSION_ID="22.04"
        VERSION="22.04.1 LTS (Jammy Jellyfish)"
        VERSION_CODENAME=jammy
        ID=ubuntu
        ID_LIKE=debian
        HOME_URL="https://www.ubuntu.com/"

uname -a:
    Linux amd-sut 5.15.0-46-generic #49-Ubuntu SMP Thu Aug 4 18:03:25 UTC 2022 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
mmio_stale_data: Not affected
retbleed: 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: Retpolines, 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

(Continued on next page)
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Test Date: Dec-2022
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Software Availability: Nov-2022

Platform Notes (Continued)

run-level 3 Nov 27 02:53

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 125G 3.4G 122G 3% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R6615
Product Family: PowerEdge
Serial: GLM4030

Additional information from dmidecode 3.3 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:
12x 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.0
BIOS Date: 11/25/2022
BIOS Revision: 1.1

(End of data from sysinfo program)

Compiler Version Notes

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

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

C++
| 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
SPEC CPU®2017 Integer Speed Result

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Compiler Version Notes (Continued)

LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

==============================================================================
Fortran | 648.exchange2_s(base)

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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
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
Dell Inc.

PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)

SPECspeed®2017_int_base = 16.2
SPECspeed®2017_int_peak = Not Run

Base Optimization Flags

C benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lflang
-lamdalloc

C++ benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc-ext

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc

Base Other Flags

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

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

Fortran 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/aocc400-flags.html
**SPEC CPU®2017 Integer Speed Result**

**Dell Inc.**

PowerEdge R6615 (AMD EPYC 9174F 16-Core Processor)

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

http://www.spec.org/cpu2017/flags/aocc400-flags.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.0.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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