



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

SPECspeed®2017_int_base = 16.3

PowerEdge R6625 (AMD EPYC 9174F 16-Core Processor)

SPECspeed®2017_int_peak = Not Run

CPU2017 License: 6573

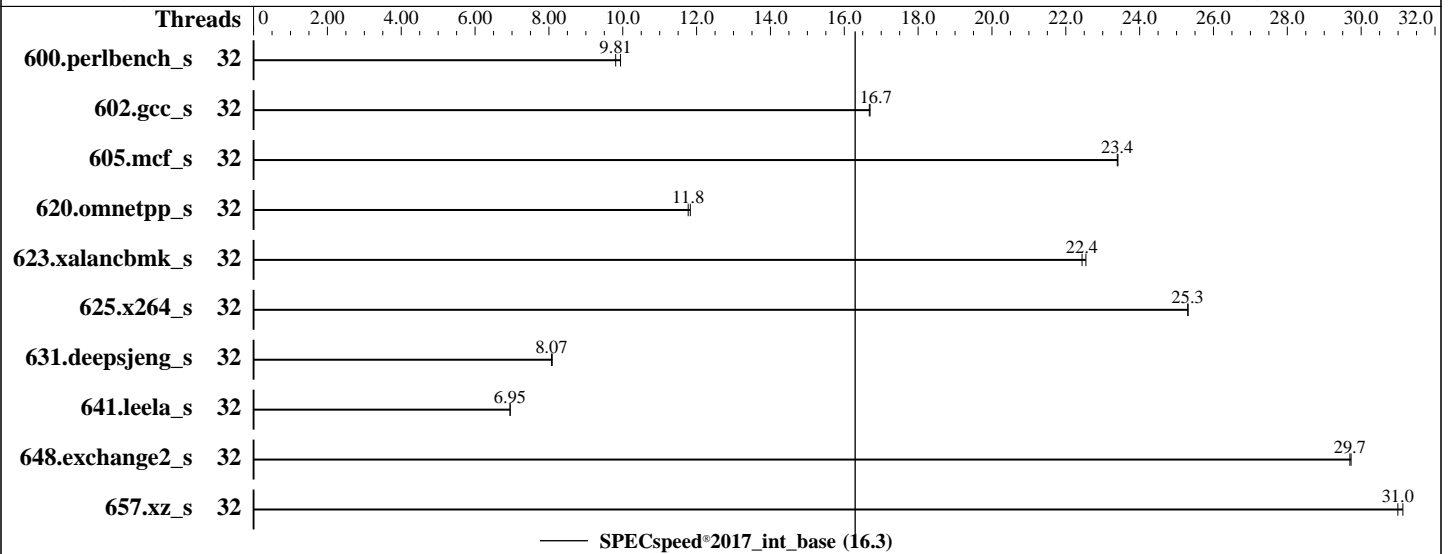
Test Date: Dec-2022

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2023

Tested by: Dell Inc.

Software Availability: Nov-2022



Hardware

CPU Name: AMD EPYC 9174F
 Max MHz: 4400
 Nominal: 4100
 Enabled: 32 cores, 2 chips
 Orderable: 1,2 chips
 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 chip, 32 MB shared / 2 cores
 Other: None
 Memory: 1536 GB (24 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.



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	179	9.94	<u>181</u>	<u>9.81</u>									
602.gcc_s	32	238	16.7	<u>239</u>	<u>16.7</u>									
605.mcf_s	32	202	23.4	<u>202</u>	<u>23.4</u>									
620.omnetpp_s	32	<u>139</u>	<u>11.8</u>	138	11.8									
623.xalancbmk_s	32	<u>63.1</u>	<u>22.4</u>	62.9	22.5									
625.x264_s	32	69.7	25.3	<u>69.7</u>	<u>25.3</u>									
631.deepsjeng_s	32	<u>178</u>	<u>8.07</u>	177	8.09									
641.leela_s	32	<u>246</u>	<u>6.95</u>	245	6.95									
648.exchange2_s	32	98.9	29.7	<u>99.0</u>	<u>29.7</u>									
657.xz_s	32	<u>199</u>	<u>31.0</u>	199	31.1									

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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>

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.

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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 = "0-31"
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 = "32"

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

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Platform Notes (Continued)

```

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

```

```

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc400-Blb/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on genoa-sut Sat Dec 10 18:38:39 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

2 "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 : 16

siblings : 16

physical 0: cores 0 1 16 17 32 33 48 49 64 65 80 81 96 97 112 113

physical 1: 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): 32
On-line CPU(s) list: 0-31
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): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4409.0000
CPU min MHz: 400.0000

```

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Platform Notes (Continued)

```

BogoMIPS:                8202.75
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
aperfmpperf 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
bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat
npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
la57 rdpid overflow_recov succor smca fsrm flush_lld
Virtualization:          AMD-V
L1d cache:               1 MiB (32 instances)
L1i cache:               1 MiB (32 instances)
L2 cache:                32 MiB (32 instances)
L3 cache:                512 MiB (16 instances)
NUMA node(s):            16
NUMA node0 CPU(s):       0,1
NUMA node1 CPU(s):       8,9
NUMA node2 CPU(s):       4,5
NUMA node3 CPU(s):       12,13
NUMA node4 CPU(s):       6,7
NUMA node5 CPU(s):       14,15
NUMA node6 CPU(s):       2,3
NUMA node7 CPU(s):       10,11
NUMA node8 CPU(s):       16,17
NUMA node9 CPU(s):       24,25
NUMA node10 CPU(s):      20,21
NUMA node11 CPU(s):      28,29
NUMA node12 CPU(s):      22,23
NUMA node13 CPU(s):      30,31
NUMA node14 CPU(s):      18,19
NUMA node15 CPU(s):      26,27
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

```

(Continued on next page)



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Platform Notes (Continued)

pointer sanitization
 Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW,
 STIBP disabled, RSB 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	1M	8	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	1M	32M	8	Unified	2	2048	1	64
L3	32M	512M	16	Unified	3	32768	1	64

```
/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: 16 nodes (0-15)
node 0 cpus: 0 1
node 0 size: 96313 MB
node 0 free: 96077 MB
node 1 cpus: 8 9
node 1 size: 96766 MB
node 1 free: 96698 MB
node 2 cpus: 4 5
node 2 size: 96731 MB
node 2 free: 96528 MB
node 3 cpus: 12 13
node 3 size: 96766 MB
node 3 free: 96703 MB
node 4 cpus: 6 7
node 4 size: 96767 MB
node 4 free: 96682 MB
node 5 cpus: 14 15
node 5 size: 96766 MB
node 5 free: 96643 MB
node 6 cpus: 2 3
node 6 size: 96767 MB
node 6 free: 95302 MB
node 7 cpus: 10 11
node 7 size: 96750 MB
node 7 free: 94154 MB
node 8 cpus: 16 17
node 8 size: 96767 MB
node 8 free: 96653 MB
node 9 cpus: 24 25
```

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Platform Notes (Continued)

```

node 9 size: 96766 MB
node 9 free: 96683 MB
node 10 cpus: 20 21
node 10 size: 96767 MB
node 10 free: 96675 MB
node 11 cpus: 28 29
node 11 size: 96766 MB
node 11 free: 96647 MB
node 12 cpus: 22 23
node 12 size: 96767 MB
node 12 free: 96681 MB
node 13 cpus: 30 31
node 13 size: 96766 MB
node 13 free: 96663 MB
node 14 cpus: 18 19
node 14 size: 96767 MB
node 14 free: 96709 MB
node 15 cpus: 26 27
node 15 size: 96745 MB
node 15 free: 96628 MB
node distances:

```

```

node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
0:  10 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
1:  11 10 12 12 12 12 12 12 32 32 32 32 32 32 32 32
2:  12 12 10 11 12 12 12 12 32 32 32 32 32 32 32 32
3:  12 12 11 10 12 12 12 12 32 32 32 32 32 32 32 32
4:  12 12 12 12 10 11 12 12 32 32 32 32 32 32 32 32
5:  12 12 12 12 11 10 12 12 32 32 32 32 32 32 32 32
6:  12 12 12 12 12 12 10 11 32 32 32 32 32 32 32 32
7:  12 12 12 12 12 12 11 10 32 32 32 32 32 32 32 32
8:  32 32 32 32 32 32 32 32 10 11 12 12 12 12 12 12
9:  32 32 32 32 32 32 32 32 11 10 12 12 12 12 12 12
10: 32 32 32 32 32 32 32 32 12 12 10 11 12 12 12 12
11: 32 32 32 32 32 32 32 32 12 12 11 10 12 12 12 12
12: 32 32 32 32 32 32 32 32 12 12 12 12 10 11 12 12
13: 32 32 32 32 32 32 32 32 12 12 12 12 11 10 12 12
14: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 10 11
15: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 11 10

```

From /proc/meminfo

MemTotal: 1584888512 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/sbin/tuned-adm active

Current active profile: latency-performance

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Platform Notes (Continued)

```
/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 genoa-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/swaps 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

```
run-level 3 Dec 10 18:37
```

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

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Platform Notes (Continued)

```

From /sys/devices/virtual/dmi/id
Vendor:          Dell Inc.
Product:         PowerEdge R6625
Product Family: PowerEdge
Serial:          BGP4016

```

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:
  24x 802C0000802C MTC40F2046S1RC48BA1 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
  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
-----

```

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Compiler Version Notes (Continued)

=====
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

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

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-EPYC-v1.0.html>

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>



SPEC CPU®2017 Integer Speed Result

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SPECspeed®2017_int_base = 16.3

PowerEdge R6625 (AMD EPYC 9174F 16-Core Processor)

SPECspeed®2017_int_peak = Not Run

CPU2017 License: 6573

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Dec-2022

Hardware Availability: Feb-2023

Software Availability: Nov-2022

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.8 on 2022-12-10 13:38:38-0500.
Report generated on 2023-02-01 18:19:06 by CPU2017 PDF formatter v6442.
Originally published on 2023-02-01.