SPEC CPU®2017 Integer Rate Result

Dell Inc.

$SPECrate^®2017\_int\_base = 352$

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

$SPECrate^®2017\_int\_peak = 369$

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

Copies — chart scale: 0 40.0 80.0 120 160 200 240 280 320 360 400 440 480 520 560 600 640 680 720 760 800 880

- 500.perlbench_r **112** — 259 / 271
- 502.gcc_r **112** — 271 / 346
- 505.mcf_r **112** — 433 / 484
- 520.omnetpp_r **112** — 162
- 523.xalancbmk_r **112** — 405 / 438
- 525.x264_r **112** — 755
- 531.deepsjeng_r **112** — 315
- 541.leela_r **112** — 351
- 548.exchange2_r **112** — 868
- 557.xz_r **112** — 201 / 202

—— SPECrate®2017_int_base (352)   ----- **SPECrate®2017_int_peak (369)**

Hardware

CPU Name: AMD EPYC 7663
Max MHz: 3500
Nominal: 2000
Enabled: 56 cores, 1 chip, 2 threads/core
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: 256 MB I+D on chip per chip, 32 MB shared / 7 cores
Other: None
Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-R)
Storage: 128 GB on tmpfs
Other: None

Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: Version 2.2.4 released Apr-2021
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-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 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369
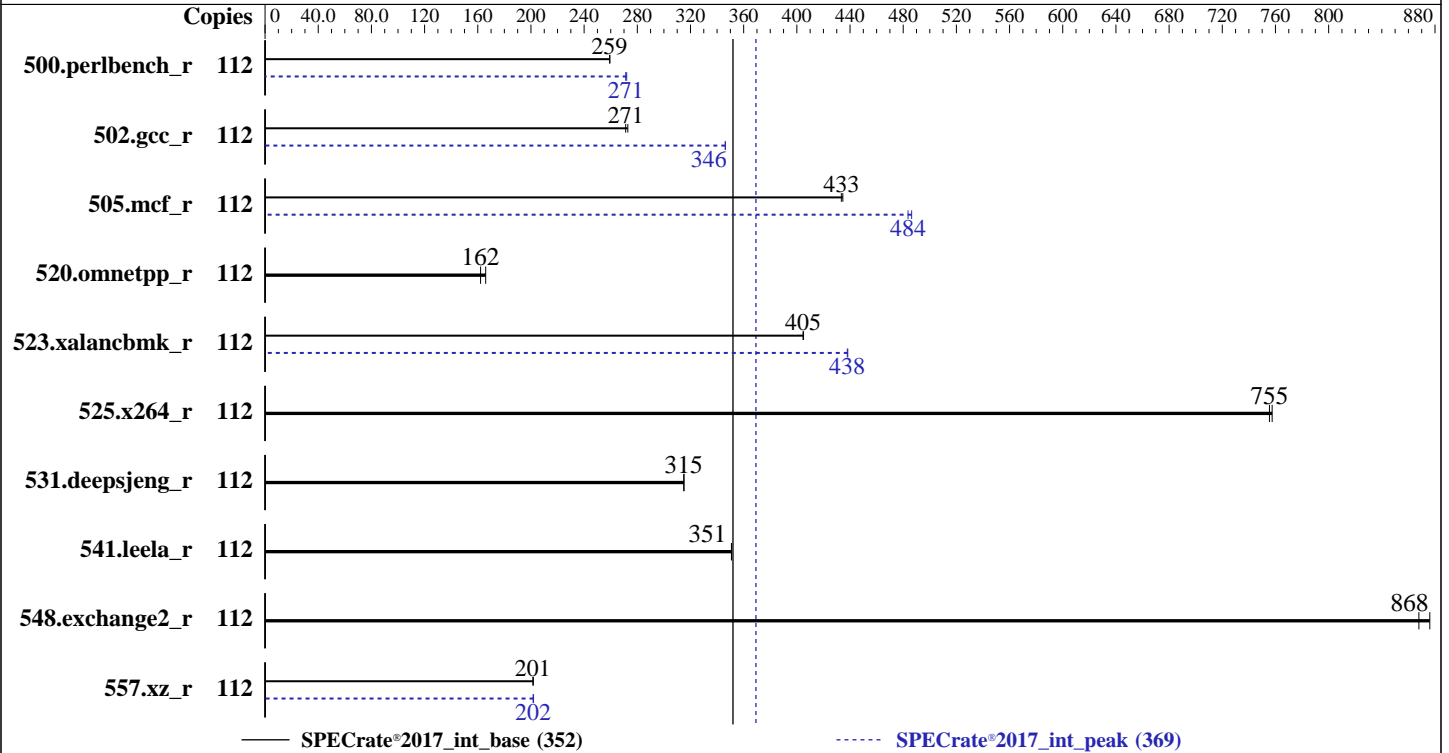
CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	112	687	259	**688**	**259**			112	655	272	**657**	**271**		
502.gcc_r	112	581	273	**585**	**271**			112	458	346	**458**	**346**		
505.mcf_r	112	416	435	**418**	**433**			112	372	486	**374**	**484**		
520.omnetpp_r	112	885	166	**906**	**162**			112	885	166	**906**	**162**		
523.xalancbmk_r	112	292	405	**292**	**405**			112	270	438	**270**	**438**		
525.x264_r	112	259	758	**260**	**755**			112	259	758	**260**	**755**		
531.deepsjeng_r	112	407	315	**408**	**315**			112	407	315	**408**	**315**		
541.leela_r	112	**529**	**351**	529	351			112	**529**	**351**	529	351		
548.exchange2_r	112	335	876	**338**	**868**			112	335	876	**338**	**868**		
557.xz_r	112	**601**	**201**	599	202			112	599	202	**600**	**202**		
SPECrate®2017_int_base =			**352**											
SPECrate®2017_int_peak =			**369**											

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
'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>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
ASLR is disabled to reduce run-to-run issues.

dirty_ratio, swappiness, zone_reclaim_mode, drop_caches and ASLR were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).
```

(Continued on next page)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

$SPECrate®2017\_int\_base = 352$

$SPECrate®2017\_int\_peak = 369$

Operating System Notes (Continued)

```
Transparent huge pages set to 'always' for Int Peak, FP Base/Peak (OS default)
Transparent huge pages set to 'madvise' for Int Base
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/mnt/ramdisk/cpu2017-1.1.7-aocc300/amd_rate_aocc300_milan_A_lib/64;/mnt
      /ramdisk/cpu2017-1.1.7-aocc300/amd_rate_aocc300_milan_A_lib/32:"
MALLOC_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:never"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB 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
```

Platform Notes

```
 BIOS settings:
       Memory Interleaving : Auto
     NUMA Nodes per Socket : 4
   L3 Cache as NUMA Domain : Enabled
 Virtualization Technology : Disabled
         DRAM Refresh Delay : Performance

            System Profile : Custom
       CPU Power Management : Maximum Performance
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Platform Notes (Continued)

```
         Memory Patrol Scrub : Disabled
         PCI ASPM L1 Link    : Disabled
            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 Fri May 14 10:58:42 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 7663 56-Core Processor
       1  "physical id"s (chips)
       112 "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 : 56
       siblings  : 112
       physical 0: cores 0 1 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
       32 33 34 35 36 37 38 40 41 42 43 44 45 46 48 49 50 51 52 53 54 56 57 58 59 60 61 62

 From lscpu:
    Architecture:        x86_64
    CPU op-mode(s):      32-bit, 64-bit
    Byte Order:          Little Endian
    CPU(s):              112
    On-line CPU(s) list: 0-111
    Thread(s) per core:  2
    Core(s) per socket:  56
    Socket(s):           1
    NUMA node(s):        8
    Vendor ID:           AuthenticAMD
    CPU family:          25
    Model:               1
    Model name:          AMD EPYC 7663 56-Core Processor
    Stepping:            1
    CPU MHz:             2577.036
    BogoMIPS:            3992.53
    Virtualization:      AMD-V
    L1d cache:           32K
    L1i cache:           32K
    L2 cache:            512K
    L3 cache:            32768K
    NUMA node0 CPU(s):   0,8,16,24,32,40,48,56,64,72,80,88,96,104
    NUMA node1 CPU(s):   1,9,17,25,33,41,49,57,65,73,81,89,97,105
```

(Continued on next page)

Dell Inc.

SPECrate®2017_int_base = 352

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_peak = 369

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

Platform Notes (Continued)

```
     NUMA node2 CPU(s):    2,10,18,26,34,42,50,58,66,74,82,90,98,106
     NUMA node3 CPU(s):    3,11,19,27,35,43,51,59,67,75,83,91,99,107
     NUMA node4 CPU(s):    4,12,20,28,36,44,52,60,68,76,84,92,100,108
     NUMA node5 CPU(s):    5,13,21,29,37,45,53,61,69,77,85,93,101,109
     NUMA node6 CPU(s):    6,14,22,30,38,46,54,62,70,78,86,94,102,110
     NUMA node7 CPU(s):    7,15,23,31,39,47,55,63,71,79,87,95,103,111
     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 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 xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
    cqm_mbm_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat npt lbrv svm_lock
    nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
    v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov 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: 8 nodes (0-7)
   node 0 cpus: 0 8 16 24 32 40 48 56 64 72 80 88 96 104
   node 0 size: 128495 MB
   node 0 free: 124568 MB
   node 1 cpus: 1 9 17 25 33 41 49 57 65 73 81 89 97 105
   node 1 size: 128942 MB
   node 1 free: 128880 MB
   node 2 cpus: 2 10 18 26 34 42 50 58 66 74 82 90 98 106
   node 2 size: 128901 MB
   node 2 free: 128828 MB
   node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107
   node 3 size: 128926 MB
   node 3 free: 128892 MB
   node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108
   node 4 size: 128926 MB
   node 4 free: 128858 MB
   node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109
   node 5 size: 128946 MB
   node 5 free: 128894 MB
   node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110
   node 6 size: 128962 MB
   node 6 free: 128787 MB
   node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

Platform Notes (Continued)

```
   node 7 size: 128945 MB
   node 7 free: 128667 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  12  10  11  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:       1056433132 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

 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 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
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Platform Notes (Continued)

```
                                                  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:
                                                  always-on, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

 run-level 3 May 14 10:46

 SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-aocc300
    Filesystem      Type   Size  Used Avail Use% Mounted on
    tmpfs           tmpfs  128G  3.7G  125G   3% /mnt/ramdisk

 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 SMBIOS" 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
    BIOS Revision:   2.2

 (End of data from sysinfo program)
```

Compiler Version Notes

```
================================================================================
 C        | 502.gcc_r(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: i386-unknown-linux-gnu
```

(Continued on next page)

Dell Inc.

SPECrate®2017_int_base = 352

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_peak = 369

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

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

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
--------------------------------------------------------------------------


==========================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
         | 525.x264_r(base, peak) 557.xz_r(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        | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
--------------------------------------------------------------------------


==========================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
         | 525.x264_r(base, peak) 557.xz_r(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++      | 523.xalancbmk_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
--------------------------------------------------------------------------


==========================================================================
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

Compiler Version Notes (Continued)

```
C++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
         | 531.deepsjeng_r(base, peak) 541.leela_r(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++      | 523.xalancbmk_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
-------------------------------------------------------------------------


=========================================================================
C++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
         | 531.deepsjeng_r(base, peak) 541.leela_r(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 | 548.exchange2_r(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
-------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Base Compiler Invocation (Continued)

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-lamdlibm -ljemalloc -lflang -lflangrti
```

C++ benchmarks:
```
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
```

(Continued on next page)

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-mllvm -reroll-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 -lamdlibm
-ljemalloc -lflang -lflangrti
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```

Base Other Flags

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

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Peak Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=false
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -fgnu89-inline
-ljemalloc

505.mcf_r: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Peak Optimization Flags (Continued)

505.mcf_r (continued):
```
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

525.x264_r: basepeak = yes

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r:
```
-m32 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-ljemalloc
```

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

Peak Other Flags

C benchmarks (except as noted below):
```
-Wno-unused-command-line-argument
```

Dell Inc.

PowerEdge R6515 (AMD EPYC 7663 56-Core Processor)

SPECrate®2017_int_base = 352

SPECrate®2017_int_peak = 369

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

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

Peak Other Flags (Continued)

502.gcc_r: `-L/usr/lib -Wno-unused-command-line-argument`
`-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32`

C++ benchmarks (except as noted below):
`-Wno-unused-command-line-argument`

523.xalancbmk_r: `-L/usr/lib -Wno-unused-command-line-argument`
`-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/aocc300-flags-A1.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-Milan-rev2.3.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-AMD-Milan-rev2.3.xml`

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

Tested with SPEC CPU®2017 v1.1.7 on 2021-05-14 11:58:41-0400.
Report generated on 2021-09-29 13:24:23 by CPU2017 PDF formatter v6442.
Originally published on 2021-09-29.