



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

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

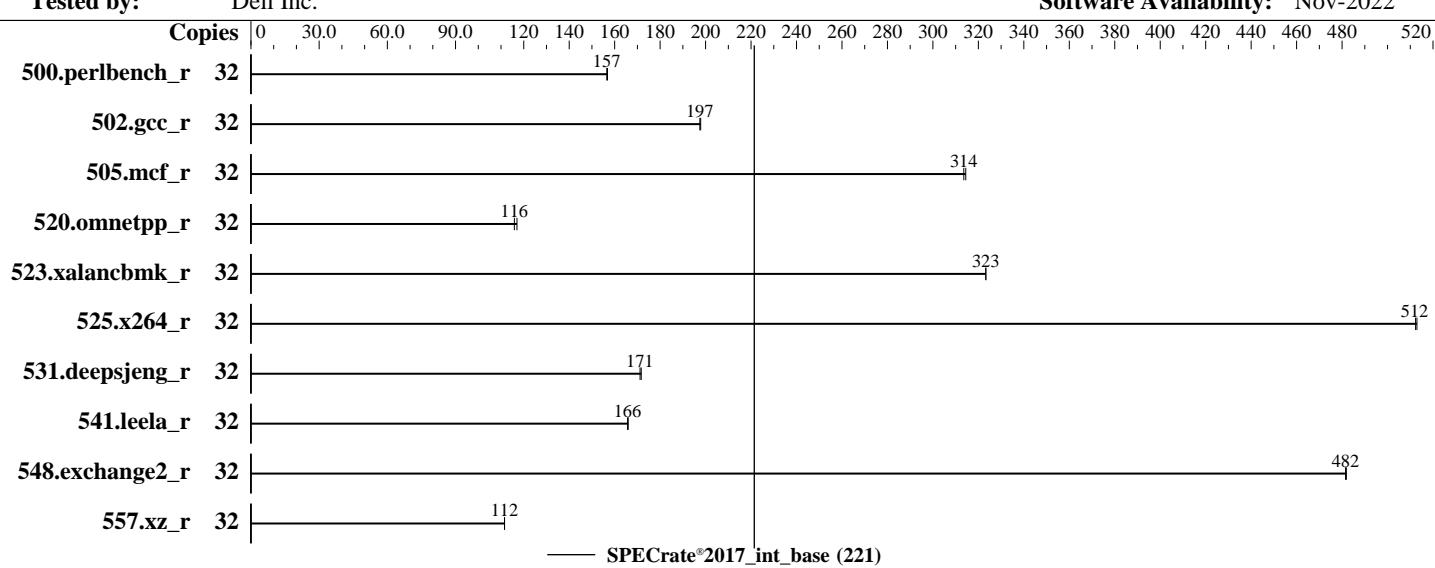
CPU2017 License: 6573

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

SPECrate®2017_int_base = 221

SPECrate®2017_int_peak = Not Run



Hardware

CPU Name: AMD EPYC 9174F
Max MHz: 4400
Nominal: 4100
Enabled: 16 cores, 1 chip, 2 threads/core
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 chip, 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
Compiler: 5.15.0-46-generic
Parallel: C/C++/Fortran: Version 4.0.0 of AOCC
Firmware: No
File System: tmpfs
System State: Version 1.1.0 released Nov-2022
Base Pointers: Run level 3 (multi-user)
Peak Pointers: 64-bit
Other: Not Applicable
Power Management: None
BIOS and OS set to prefer performance at the cost of additional power usage.



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Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	32	325	157	325	157											
502.gcc_r	32	229	198	229	197											
505.mcf_r	32	164	314	165	314											
520.omnetpp_r	32	362	116	359	117											
523.xalancbmk_r	32	105	323	105	323											
525.x264_r	32	109	512	109	513											
531.deepsjeng_r	32	214	172	214	171											
541.leela_r	32	319	166	320	166											
548.exchange2_r	32	174	482	174	482											
557.xz_r	32	310	112	310	112											

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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) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.

To enable THP for all allocations for peak runs,
'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:

```
LD_LIBRARY_PATH =
    "/mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/amd_rate_aocc400_genoa_B_lib/lib
     :/mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/amd_rate_aocc400_genoa_B_lib/lib
      32:"
```

MALLOC_CONF = "retain:true"

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
    Virtualization Technology : Disabled
        NUMA Nodes per Socket : 4
    L3 Cache as NUMA Domain : Enabled

    System Profile : Custom
    Memory Patrol Scrub : Disabled
```

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Platform Notes (Continued)

PCI ASPM L1 Link

Power Management : Disabled

Determinism Slider : Power Determinism

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d

running on amd-sut Tue Dec 6 12:05:39 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
  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 : 16
  siblings   : 32
  physical 0: cores 0 1 8 9 16 17 24 25 32 33 40 41 48 49 56 57
```

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:   2
Core(s) per socket:   16
Socket(s):             1
Stepping:              1
Frequency boost:      enabled
CPU max MHz:          4409.0000
CPU min MHz:          400.0000
BogoMIPS:              8202.55
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
                      aperfmpfperf 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
```

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Platform Notes (Continued)

```
bpext perfctr_llc mwaitx cpb cat_13 cdp_13 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqmq rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqmq_llc cqmq_occup_llc cqmq_mbm_total
cqmq_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_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): 0,1,16,17

NUMA node1 CPU(s): 8,9,24,25

NUMA node2 CPU(s): 4,5,20,21

NUMA node3 CPU(s): 12,13,28,29

NUMA node4 CPU(s): 6,7,22,23

NUMA node5 CPU(s): 14,15,30,31

NUMA node6 CPU(s): 2,3,18,19

NUMA node7 CPU(s): 10,11,26,27

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/swaps barriers and __user pointer sanitization

Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW,

STIBP always-on, 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	512K	8	Data	1	64	1	64
L1i	32K	512K	8	Instruction	1	64	1	64
L2	1M	16M	8	Unified	2	2048	1	64
L3	32M	256M	16	Unified	3	32768	1	64

/proc/cpuinfo cache data
cache size : 1024 KB

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Platform Notes (Continued)

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 16 17
node 0 size: 96312 MB
node 0 free: 96045 MB
node 1 cpus: 8 9 24 25
node 1 size: 96765 MB
node 1 free: 96581 MB
node 2 cpus: 4 5 20 21
node 2 size: 96731 MB
node 2 free: 96503 MB
node 3 cpus: 12 13 28 29
node 3 size: 96765 MB
node 3 free: 96564 MB
node 4 cpus: 6 7 22 23
node 4 size: 96766 MB
node 4 free: 96493 MB
node 5 cpus: 14 15 30 31
node 5 size: 96765 MB
node 5 free: 96496 MB
node 6 cpus: 2 3 18 19
node 6 size: 96766 MB
node 6 free: 94671 MB
node 7 cpus: 10 11 26 27
node 7 size: 96729 MB
node 7 free: 94769 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:      792171852 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 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/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Retpolines, 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 Nov 25 18:05

```
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
```

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Platform Notes (Continued)

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	500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
	525.x264_r(base) 557.xz_r(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++	520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
	541.leela_r(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 | 548.exchange2_r(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

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 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather
-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdaloc
```

C++ benchmarks:

```
-m64 -flio -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdaloc-ext
```

Fortran benchmarks:

```
-m64 -flio -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 -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdaloc
```

Base Other Flags

C benchmarks:

```
-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>



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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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