**SPEC CPU®2017 Integer Rate Result**  

**Dell Inc.**  

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

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Dell Inc.</th>
<th>Hardware Availability</th>
<th>Feb-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Dell Inc.</td>
<td>Software Availability</td>
<td>Nov-2022</td>
</tr>
</tbody>
</table>

**SPECrate®2017_int_base = 442**  

**SPECrate®2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Copies</th>
<th>500.perlbench_r</th>
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<tbody>
<tr>
<td></td>
<td>64</td>
<td>64</td>
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</table>

**Hardware**

- **CPU Name:** AMD EPYC 9174F
- **Max MHz:** 4400
- **Nominal:** 4100
- **Enabled:** 32 cores, 2 chips, 2 threads/core
- **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:** No
- **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.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>500.perlbench_r</th>
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<tr>
<td>Seconds</td>
<td>322</td>
<td>231</td>
<td>165</td>
<td>369</td>
<td>105</td>
<td>110</td>
<td>214</td>
<td>320</td>
<td>174</td>
<td>311</td>
</tr>
<tr>
<td>Ratio</td>
<td>317</td>
<td>392</td>
<td>628</td>
<td>228</td>
<td>646</td>
<td>1020</td>
<td>342</td>
<td>320</td>
<td>963</td>
<td>223</td>
</tr>
<tr>
<td>Seconds (median)</td>
<td>320</td>
<td>356</td>
<td>165</td>
<td>356</td>
<td>105</td>
<td>110</td>
<td>215</td>
<td>320</td>
<td>174</td>
<td>311</td>
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<tr>
<td>Ratio (median)</td>
<td>318</td>
<td>236</td>
<td>628</td>
<td>236</td>
<td>646</td>
<td>1020</td>
<td>342</td>
<td>320</td>
<td>964</td>
<td>223</td>
</tr>
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</table>

**SPECrate®2017_int_base = 442**

**SPECrate®2017_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)
Dell Inc. PowerEdge R6625 (AMD EPYC 9174F 16-Core Processor) SPECrate®2017_int_base = 442 SPECrate®2017_int_peak = Not Run

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

(Continued on next page)
### Dell Inc.

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

<table>
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</tbody>
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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-aoccy400-B1b/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d  
running on genoa-sut Fri Dec 9 21:52:12 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

```plaintext
model name : AMD EPYC 9174F 16-Core Processor
2 "physical id"s (chips)
64 "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
physical 1: 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:

```plaintext
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): 64
On-line CPU(s) list: 0-63
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): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4409.0000
CPU min MHz: 400.0000
BogoMIPS: 8202.32
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 rafi 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 ssse4a
```

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

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**Platform Notes (Continued)**

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 vmcall fsqsbse bmlv axv2 sme perf_avx512f axv512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsave cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local avx512_bf16 clzero irperf xsaveerpr rdpru wbnoinvd amd_pbin ccpp arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgiv v_vmsctl avx512vbm umip pku ospke avx512_vbmi2 gfn vaes vpcmugdq avx512_vnni avx512_bitalg avx512_vppcntdq la57 rdpid overflow_recov succor smca farm flush_l1d

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): 0,1,32,33  
NUMA node1 CPU(s): 8,9,40,41  
NUMA node2 CPU(s): 4,5,36,37  
NUMA node3 CPU(s): 12,13,44,45  
NUMA node4 CPU(s): 6,7,38,39  
NUMA node5 CPU(s): 14,15,46,47  
NUMA node6 CPU(s): 2,3,4,43  
NUMA node7 CPU(s): 10,11,42,43  
NUMA node8 CPU(s): 16,17,48,49  
NUMA node9 CPU(s): 24,25,56,57  
NUMA node10 CPU(s): 20,21,52,53  
NUMA node11 CPU(s): 28,29,60,61  
NUMA node12 CPU(s): 22,23,54,55  
NUMA node13 CPU(s): 30,31,62,63  
NUMA node14 CPU(s): 18,19,50,51  
NUMA node15 CPU(s): 26,27,58,59  
Vulnerability Itlb multihit: Not affected  
Vulnerability Llhf: 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 always-on, RSB filling  
Vulnerability Srbsd: Not affected  
Vulnerability Tsx async abort: Not affected

(Continued on next page)
Dell Inc. PowerEdge R6625 (AMD EPYC 9174F 16-Core Processor)

SPECrate®2017_int_base = 442
SPECrate®2017_int_peak = Not Run

CPU2017 License: 6573
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Software Availability: Nov-2022

Platform Notes (Continued)

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>1M</td>
<td>8</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>1M</td>
<td>32M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>512M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

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 32 33
node 0 size: 96312 MB
node 0 free: 92496 MB
node 1 cpus: 8 9 40 41
node 1 size: 96765 MB
node 1 free: 96527 MB
node 2 cpus: 4 5 36 37
node 2 size: 96766 MB
node 2 free: 96572 MB
node 3 cpus: 12 13 44 45
node 3 size: 96765 MB
node 3 free: 96626 MB
node 4 cpus: 6 7 38 39
node 4 size: 96766 MB
node 4 free: 96630 MB
node 5 cpus: 14 15 46 47
node 5 size: 96765 MB
node 5 free: 96594 MB
node 6 cpus: 2 3 34 35
node 6 size: 96766 MB
node 6 free: 96534 MB
node 7 cpus: 10 11 42 43
node 7 size: 96749 MB
node 7 free: 96605 MB
node 8 cpus: 16 17 48 49
node 8 size: 96766 MB
node 8 free: 96651 MB
node 9 cpus: 24 25 56 57
node 9 size: 96765 MB
node 9 free: 96632 MB
node 10 cpus: 20 21 52 53
node 10 size: 96766 MB
node 10 free: 96649 MB
node 11 cpus: 28 29 60 61

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

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**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>node</th>
<th>size</th>
<th>free</th>
<th>cpus</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>96765 MB</td>
<td>96635 MB</td>
<td>22 23 54 55</td>
</tr>
<tr>
<td>12</td>
<td>96766 MB</td>
<td>96615 MB</td>
<td>30 31 62 63</td>
</tr>
<tr>
<td>13</td>
<td>96765 MB</td>
<td>96654 MB</td>
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<tr>
<td>14</td>
<td>96766 MB</td>
<td>96639 MB</td>
<td>18 19 50 51</td>
</tr>
<tr>
<td>15</td>
<td>96742 MB</td>
<td>96626 MB</td>
<td>26 27 58 59</td>
</tr>
</tbody>
</table>

From /proc/meminfo
MemTotal: 1584878512 kB
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

(Continued on next page)
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Platform Notes (Continued)

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/swapgs 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 Dec 9 21:50

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 R6625
Product Family: PowerEdge
Serial: BGP4016

(Continued on next page)
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**Platform Notes (Continued)**

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
| 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.ieela_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

```
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

(Continued on next page)
Dell Inc.  Dell Inc.

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Compiler Version Notes (Continued)

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,-mlllvm -Wl,align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,reduce-array-computations=3
-Wl,-mlllvm -Wl,ldist-scalar-expand -fenable-aggressive-gather
-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mlllvm -unroll-threshold=50
-mlllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mlllvm -reduce-array-computations=3 -zopt -lamdlibm -flang
-lamdaloc

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

**Dell Inc.**

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

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### Base Optimization Flags (Continued)

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

**Fortran benchmarks:**
- `-m64 -flto -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mlllvm -Wl,-inline-recursion=4 -Wl,-mlllvm -Wl,-lsr-in-nested-loop`
- `-Wl,-mlllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions`
- `-mlllvm -optimize-strided-mem-cost -floop-transform`
- `-mlllvm -unroll-aggressive -mlllvm -unroll-threshold=500 -lamdlibm`
- `-lflang -lamdalloc`

### 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


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

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