Dell Inc.

PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)

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

SPECr®2017_int_base = 1300
SPECr®2017_int_peak = Not Run

Test Date: Nov-2022
Hardware Availability: Feb-2023
Software Availability: Nov-2022

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<td>256</td>
</tr>
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<tr>
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<tr>
<td>531.deepsjeng_r</td>
<td>256</td>
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<tr>
<td>541.leela_r</td>
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<tr>
<td>548.exchange2_r</td>
<td>256</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>256</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: AMD EPYC 9554
Max MHz: 3750
Nominal: 3100
Enabled: 128 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 / 8 cores
Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 130 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 1.0.2 released Oct-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>Copies</th>
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<th>Ratio</th>
<th>Seconds</th>
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<tr>
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<td>564</td>
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<td>132</td>
<td>3400</td>
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<td></td>
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<tr>
<td>531.deepsjeng_r</td>
<td>256</td>
<td>252</td>
<td>1160</td>
<td>252</td>
<td>1160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>256</td>
<td>373</td>
<td>1140</td>
<td>374</td>
<td>1130</td>
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<tr>
<td>548.exchange2_r</td>
<td>256</td>
<td>208</td>
<td>3230</td>
<td>208</td>
<td>3230</td>
<td></td>
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<tr>
<td>557.xz_r</td>
<td>256</td>
<td>426</td>
<td>648</td>
<td>425</td>
<td>651</td>
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<td></td>
</tr>
</tbody>
</table>

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)
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 130 GB ramdisk created with the cmd: "mount -t tmpfs -o size=130G 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
SPEC CPU®2017 Integer Rate Result

Dell Inc. PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)

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

SPECraten\textsuperscript{2017\_int\_base} = 1300
SPECraten\textsuperscript{2017\_int\_peak} = Not Run

Test Date: Nov-2022
Hardware Availability: Feb-2023
Software Availability: Nov-2022

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 982a61ec0915b55891ef0e16acac64d
running on amd-sut Fri Nov 4 19:09:54 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 9554 64-Core Processor
- 2 "physical id"s (chips)
- 256 "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: 64
  - siblings: 128
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  - physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

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): 256
- On-line CPU(s) list: 0-255
- Vendor ID: AuthenticAMD
- Model name: AMD EPYC 9554 64-Core Processor
- CPU family: 25
- Model: 17
- Thread(s) per core: 2
- Core(s) per socket: 64
- Socket(s): 2
- Stepping: 1
- Frequency boost: enabled
- CPU max MHz: 3764.0000
- CPU min MHz: 400.0000
- BogoMIPS: 6201.46
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr

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

Dell Inc.

PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)

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CPU2017 License: 6573
Test Sponsor: Dell Inc.
Test Date: Nov-2022
Hardware Availability: Feb-2023
Tested by: Dell Inc.
Software Availability: Nov-2022

Platform Notes (Continued)

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

(Continued on next page)
Dell Inc.

PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)  

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SPECrater®2017_int_peak = Not Run

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Platform Notes (Continued)

STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

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>PHYS-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>4M</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>4M</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>128M</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>

/platform/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 2 3 4 5 6 7 128 129 130 131 132 133 134 135
    node 0 size: 96310 MB
    node 0 free: 95885 MB
    node 1 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
    node 1 size: 96763 MB
    node 1 free: 96406 MB
    node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
    node 2 size: 96764 MB
    node 2 free: 96323 MB
    node 3 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
    node 3 size: 96763 MB
    node 3 free: 96394 MB
    node 4 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
    node 4 size: 96764 MB
    node 4 free: 96446 MB
    node 5 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
    node 5 size: 96763 MB
    node 5 free: 96404 MB
    node 6 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
    node 6 size: 96764 MB
    node 6 free: 96441 MB
    node 7 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
    node 7 size: 96747 MB
    node 7 free: 96395 MB
    node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199
    node 8 size: 96728 MB
    node 8 free: 96424 MB
    node 9 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
    node 9 size: 96763 MB
    node 9 free: 96536 MB

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

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Platform Notes (Continued)

From /proc/meminfo
MemTotal: 1584825332 kB
HugePages_Total: 0
Hugepage_size: 2048 kB

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

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

(Continued on next page)
Dell Inc.  
PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)  

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Platform Notes (Continued)

/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: Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass):
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 Nov 4 16:46

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-aocc400-B1b
  Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 130G 3.4G 127G 3% /mnt/ramdisk

From /sys/devices/virtual/dmi/id

(Continued on next page)
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Platform Notes (Continued)

Vendor: Dell Inc.
Product: PowerEdge R7625
Product Family: PowerEdge
Serial: 1234567

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 80AD000080AD HMCG94MEBRA109N 64 GB 2 rank 4800

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.2
BIOS Date: 10/17/2022
BIOS Revision: 1.0

(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.leea_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)

(Continued on next page)
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Compiler Version Notes (Continued)

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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
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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, -ml1vm -Wl, -align-all-nofallthru-blocks=6
-Wl, -ml1vm -Wl, -reduce-array-computations=3
-Wl, -ml1vm -Wl, -ldist-scalar-expand -fenable-aggressive-gather
-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -ml1vm -unroll-threshold=50
-ml1vm -inline-threshold=1000 -fremap-arrays -fstrip-mining

(Continued on next page)
Dell Inc.  
PowerEdge R7625 (AMD EPYC 9554 64-Core Processor)  

**Base Optimization Flags (Continued)**

C benchmarks (continued):
- `mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang`
- `lmdalloc`

C++ benchmarks:
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3`
- `-march=znver4 -fvecclib=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`
- `-lmdalloc-ext`

Fortran benchmarks:
- `-m64 -flto -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`
- `-fvecclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions`
- `-mllvm -optimize-strided-mem-cost -floop-transform`
- `-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm`
- `-lflang -lmdalloc`

**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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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 2022-11-04 15:09:53-0400.
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