Dell Inc.
(Test Sponsor: Dell Inc)

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)

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

SPECrate®2017_int_base = 106
SPECrate®2017_int_peak = 110

Test Date: Sep-2020
Hardware Availability: Jul-2020
Software Availability: Apr-2020

Hardware

CPU Name: Intel Xeon Silver 4215
Max MHz: 3500
Nominal: 2500
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 1, 2
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 11 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.2
Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
Parallel: No
Compiler: Version 2.8.1 released Jun-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage

SPEC CPU®2017 Integer Rate Result

Copies

500.perlbench_r 32
502.gcc_r 32
505.mcf_r 32
520.omnetpp_r 32
523.xalancbmk_r 32
525.x264_r 32
531.deepsjeng_r 32
541.leela_r 32
548.exchange2_r 32
557.xz_r 32

SPECrate®2017_int_base (106)
SPECrate®2017_int_peak (110)
Dell Inc.  
(Test Sponsor: Dell Inc)  
PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)  

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

Results Table

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Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
"/home/cpu2017-ic19.1u1/lib/intel64:/home/cpu2017-ic19.1u1/lib/ia32:/home/cpu2017-ic19.1u1/je5.0.1-32"

MALLOC_CONF = "retain:true"
SPEC CPU®2017 Integer Rate Result

Dell Inc. (Test Sponsor: Dell Inc)

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)

SPECratenome

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General Notes

Binaries compiled on a system with 1x Intel Core i9–7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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.

Platform Notes

BIOS settings:
Virtualization Technology disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub set to standard
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /home/cpu2017-ic19.1u1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1be6e46a485a0011
running on RHEL-8-2-SUT Wed Sep 16 08:40:03 2020

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

<table>
<thead>
<tr>
<th>model name</th>
<th>Intel(R) Xeon(R) Silver 4215 CPU @ 2.50GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 &quot;physical id&quot;s (chips)</td>
<td></td>
</tr>
<tr>
<td>32 &quot;processors&quot;</td>
<td></td>
</tr>
</tbody>
</table>

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 : 8

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

Dell Inc.
(Test Sponsor: Dell Inc)

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc
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SPECrate®2017_int_base = 106
SPECrate®2017_int_peak = 110

Test Date: Sep-2020
Hardware Availability: Jul-2020
Software Availability: Apr-2020

Platform Notes (Continued)

siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4215 CPU @ 2.50GHz
Stepping: 6
CPU MHz: 1000.046
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 5000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrr pdcm pcd pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pstate ssbd mba ibrs ibpb stibp ibrs enhanced tpr_shadow vnumi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaves xsaveopt xsavec xgetbv1 xsave cqm_llc cqm_occur llc
ckq_mbb_total ckq_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld
arch_capabilities

/proc/cpuinfo cache data
cache size : 11264 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a

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

Dell Inc.  
(Test Sponsor: Dell Inc)

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)

**SPECrate®2017_int_base = 106**

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**Platform Notes (Continued)**

physical chip.  
available: 2 nodes (0-1)  
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30  
node 0 size: 192074 MB  
node 0 free: 191374 MB  
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31  
node 1 size: 193504 MB  
node 1 free: 192690 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10  

From /proc/meminfo  
MemTotal: 394832336 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB  

From /etc/*release* /etc/*version*  
os-release:  
NAME="Red Hat Enterprise Linux"  
VERSION="8.2 (Ootpa)"  
ID="rhel"  
ID_LIKE="fedora"  
VERSION_ID="8.2"  
PLATFORM_ID="platform:el8"  
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"  
ANSI_COLOR="0;31"  
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)  
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga  
uname -a:  
Linux RHEL-8-2-SUT 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020 x86_64 x86_64 GNU/Linux  

Kernel self-reported vulnerability status:  
itlb_multihit: KVM: Vulnerable  
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 seccomp  
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
SPEC CPU®2017 Integer Rate Result

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</tbody>
</table>

Platform Notes (Continued)

```plaintext
rsb filling
Mitigation: Clear CPU buffers; SMT vulnerable
```

tsx_async_abort:

```
run-level 3 Sep 16 08:38 last=5
```

SPEC is set to: /home/cpu2017-ic19.1u1

```
Filesystem    Type  Size  Used  Avail  Use% Mounted on
/dev/mapper/rhel-home xfs   392G  7.1G  385G   2% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS:    Dell Inc. 2.8.1 06/30/2020
Vendor:  Dell Inc.
Product: PowerEdge R540
Product Family: PowerEdge
```

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:

1x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
6x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
5x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
4x Not Specified Not Specified
```

(End of data from sysinfo program)

Memory running at 2400

Compiler Version Notes

```
C       | 502.gcc_r(peak)
```

```
Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
        | 525.x264_r(base, peak) 557.xz_r(base)
```

```
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

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

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Spec CPU®2017 Integer Rate Result

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Compiler Version Notes (Continued)

NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
Fortran | 548.exchange2_r(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

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

Dell Inc.  
(Test Sponsor: Dell Inc)  

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)  

SPECr®2017_int_base = 106  
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CPU2017 License: 55  
Test Sponsor: Dell Inc  
Tested by: Dell Inc.

Base Portability Flags (Continued)

502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
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 -m64 -mbranches -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc

C++ benchmarks:
-m64 -m64 -mbranches -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -mbranches-within-32B-boundaries  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)
### Peak Compiler Invocation (Continued)

Fortran benchmarks:

`ifort`

### Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td><code>-DSPEC_LP64 -DSPEC_LINUX_X64</code></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td><code>-D_FILE_OFFSET_BITS=64</code></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td><code>-DSPEC_LP64 -DSPEC_LINUX</code></td>
</tr>
<tr>
<td>525.x264_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>541.leela_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>557.xz_r</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
</tbody>
</table>

### Peak Optimization Flags

C benchmarks:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td><code>-W1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)</code></td>
</tr>
<tr>
<td></td>
<td><code>-xCORE-AVX512 -ipo -O3 -no-prec-div</code></td>
</tr>
<tr>
<td></td>
<td><code>-qopt-mem-layout-trans=4 -fno-strict-overflow</code></td>
</tr>
<tr>
<td></td>
<td><code>-mbranches-within-32B-boundaries</code></td>
</tr>
<tr>
<td></td>
<td><code>-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin</code></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td><code>-m32</code></td>
</tr>
<tr>
<td></td>
<td><code>-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin</code></td>
</tr>
<tr>
<td></td>
<td><code>-W1,-plugin-opt=-x86-branches-within-32B-boundaries</code></td>
</tr>
<tr>
<td></td>
<td><code>-W1,-z,muldefs -fprofile-generate(pass 1)</code></td>
</tr>
<tr>
<td></td>
<td><code>-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto</code></td>
</tr>
<tr>
<td></td>
<td><code>-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold</code></td>
</tr>
<tr>
<td></td>
<td><code>-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib</code></td>
</tr>
<tr>
<td></td>
<td><code>-ljemalloc</code></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td><code>basepeak = yes</code></td>
</tr>
</tbody>
</table>
**SPEC CPU®2017 Integer Rate Result**

Dell Inc.  
(Test Sponsor: Dell Inc)

PowerEdge R540 (Intel Xeon Silver 4215, 2.5 GHz)

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Sep-2020</th>
</tr>
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<tbody>
<tr>
<td>Test Sponsor: Dell Inc</td>
<td>Hardware Availability: Jul-2020</td>
</tr>
<tr>
<td>Tested by: Dell Inc</td>
<td>Software Availability: Apr-2020</td>
</tr>
</tbody>
</table>

**SPECrate®2017_int_base = 106**

**SPECrate®2017_int_peak = 110**

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**Peak Optimization Flags (Continued)**

525.x264_r: -m64 -qnextgen -std=c11  
-W1,-plugin-opt=-x86-branches-within-32B-boundaries  
-W1,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math  
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc

557.xz_r: -W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

---

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:

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml


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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 v1.1.0 on 2020-09-16 09:40:02-0400.
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