### Dell Inc.

PowerEdge R440 (Intel Xeon Silver 4214, 2.20 GHz)

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Apr-2020</th>
</tr>
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<tbody>
<tr>
<td>Hardware Availability</td>
<td>Feb-2020</td>
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| Software Availability | Nov-2019 |

#### SPEC CPU®2017 Integer Speed Result

**SPECspeed®2017_int_base = 7.86**

**SPECspeed®2017_int_peak = 7.99**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>24</td>
<td>5.35</td>
<td>6.64</td>
</tr>
<tr>
<td>gcc_s</td>
<td>24</td>
<td>7.72</td>
<td>10.1</td>
</tr>
<tr>
<td>mcf_s</td>
<td>24</td>
<td>5.68</td>
<td>10.3</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>24</td>
<td>8.60</td>
<td>11.5</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>24</td>
<td>4.52</td>
<td>13.0</td>
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<tr>
<td>x264_s</td>
<td>24</td>
<td>3.66</td>
<td>17.9</td>
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<tr>
<td>deepsjeng_s</td>
<td>24</td>
<td>5.25</td>
<td>18.2</td>
</tr>
<tr>
<td>leela_s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name**: Intel Xeon Silver 4214
- **Max MHz**: 3200
- **Nominal**: 2200
- **Enabled**: 24 cores, 2 chips
- **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**: 16.5 MB I+D on chip per chip
- **Memory**: 384 GB (12 x 32 GB 2Rx8 PC4-3200V-R, running at 2400)
- **Storage**: 1 x 1.92 TB SATA SSD
- **Other**: None

#### Software

- **OS**: Red Hat Enterprise Linux 8.1
- **Compiler**: C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux
- **Parallel**: Yes
- **Firmware**: Version 2.6.3 released Jan-2020
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: 64-bit
- **Other**: None
- **Power Management**: jemalloc memory allocator V5.0.1
  BIOS set to prefer performance at the cost of additional power usage.
**SPEC CPU®2017 Integer Speed Result**

Dell Inc.

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SPECspeed®2017_int_base = 7.86

SPECspeed®2017_int_peak = 7.99

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>332</td>
<td>5.35</td>
<td>331</td>
<td>5.36</td>
<td>332</td>
<td>5.34</td>
<td>24</td>
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<td>6.04</td>
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<td>295</td>
<td>6.03</td>
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<tr>
<td>602.gcc_s</td>
<td>24</td>
<td>515</td>
<td>7.72</td>
<td>513</td>
<td>7.76</td>
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<tr>
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<td>10.1</td>
<td>472</td>
<td>10.0</td>
<td>468</td>
<td>10.1</td>
<td>24</td>
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<td>10.3</td>
<td>457</td>
<td>10.3</td>
<td>461</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>284</td>
<td>5.73</td>
<td>287</td>
<td>5.68</td>
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<td>631.deepsjeng_s</td>
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<td>24</td>
<td>339</td>
<td>18.2</td>
<td>339</td>
<td>18.2</td>
<td>339</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

**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:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-9900K 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.

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:
  sync; echo 3> /proc/sys/vm/drop_caches

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

**Dell Inc.**

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<th>SPECspeed®2017_int_base</th>
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<tr>
<td>7.86</td>
<td>7.99</td>
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</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

<table>
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## 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 disabled
  - 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/bin/sysinfo
- Rev: r6365 of 2019-08-21 295195f888a3d7edbe16e46a485a0011
- running on localhost.localdomain Thu Apr 23 06:02:57 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From /proc/cpuinfo
  - model name : Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
  - 2 "physical id"s (chips)
  - 24 "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 : 12
    - siblings : 12
    - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
    - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

- From lscpu:
  - Architecture: x86_64
  - CPU op-mode(s): 32-bit, 64-bit
  - Byte Order: Little Endian
  - CPU(s): 24
  - On-line CPU(s) list: 0-23
  - Thread(s) per core: 1
  - Core(s) per socket: 12
  - Socket(s): 2
  - NUMA node(s): 2
  - Vendor ID: GenuineIntel

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

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Test Date: Apr-2020
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Platform Notes (Continued)

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2331.419
CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23
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
xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pipn ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept voltd pmx ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

From /proc/cpuinfo cache data
    cache size: 16896 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
    physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22
    node 0 size: 192075 MB
    node 0 free: 191143 MB
    node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
    node 1 size: 193507 MB
    node 1 free: 192526 MB
    node distances:
      node 0 1
        0: 10 21
        1: 21 10

From /proc/meminfo
    MemTotal: 394836832 kB

(Continued on next page)
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SPECspeed®2017_int_base = 7.86
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Platform Notes (Continued)

HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.1 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.1.0"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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, RSB filling

run-level 3 Apr 23 06:02 last=5

SPEC is set to: /home/cpu2017

Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   1.7T   20G  1.7T   2% /home

From /sys/devices/virtual/dmi/id
BIOS:    Dell Inc. 2.6.3 01/18/2020
Vendor:  Dell Inc.
Product: PowerEdge R440
Product Family: PowerEdge
Serial:  F9TD613

Additional information from dmidecode follows. WARNING: Use caution when you interpret

(Continued on next page)
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Platform Notes (Continued)

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 002C069D002C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak) |
==============================================================================
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak) |
==============================================================================
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

==============================================================================
| Fortran | 648.exchange2_s(base, peak) |
==============================================================================
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
==============================================================================

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)
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SPECspeed®2017_int_base = 7.86
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-1/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-1/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

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

Fortran benchmarks:
ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -L/usr/local/je5.0.1-64/lib
-ljemalloc

605.mcf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

(Continued on next page)
Dell Inc.

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Peak Optimization Flags (Continued)

620.omnetpp_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
    -ipo -xCORE-AVX2 -O3 -no-prec-div
    -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS.OPENMP
    -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
    -lqkmalloc

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: 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-ic19.0u5-official-linux64_rev0.xml