Dell Inc.

PowerEdge R740xd (Intel Xeon Silver 4214R, 2.40 GHz)

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

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

Dell Inc.

SPEC CPU®2017 Integer Rate Result

SPECrate®2017_int_base = 160
SPECrate®2017_int_peak = 165

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base (160)</th>
<th>SPECrate®2017_int_peak (165)</th>
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<tr>
<td>perlbench_r</td>
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<td>mcf_r</td>
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<td>omnetpp_r</td>
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<td>x264_r</td>
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<tr>
<td>deepsjeng_r</td>
<td>48</td>
<td>123</td>
<td>329</td>
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<tr>
<td>leela_r</td>
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<td>exchange2_r</td>
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<td>294</td>
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<tr>
<td>xz_r</td>
<td>48</td>
<td>94.5</td>
<td>96.2</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Silver 4214R
Max MHz: 3500
Nominal: 2400
Enabled: 24 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: 16.5 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933V-R, running at 2400)
Storage: 1 x 1.92 TB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.1
kernel 4.18.0-147.el8.x86_64
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
Firmware: Version 2.7.7 released May-2020
File System: tmpfs
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**

Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
<thead>
<tr>
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SPECrate®2017_int_base = 160
SPECrate®2017_int_peak = 165

### Results Table

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<th>Seconds</th>
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<td>520.omnetpp_r</td>
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<td>531.deepsjeng_r</td>
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<tr>
<td>557.xz_r</td>
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<td>94.7</td>
<td>549</td>
<td>94.5</td>
<td>48</td>
<td>538</td>
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</tbody>
</table>

### 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 = "/mnt/ramdisk/cpu2017-ic19.1u1/lib/intel64:/mnt/ramdisk/cpu2017-ic19.1u1/lib/ia32:/mnt/ramdisk/cpu2017-ic19.1u1/je5.0.1-32"
MALLOC_CONF = "retain:true"
```
**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**

PowerEdge R740xd (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
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<tbody>
<tr>
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</tr>
</tbody>
</table>

**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.

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
```

runcpu command invoked through numactl i.e.:

```
numactl --interleave=all runcpu <etc>
```

Benchmark run from a 225 GB ramdisk created with the cmd; "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

jemalloc, a general purpose malloc implementation

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


**Platform Notes**

BIOS settings:

Sub NUMA Cluster enabled

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

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 /mnt/ramdisk/cpu2017-ic19.1u1/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e464a485a0011

running on user-pc.spa.lab Mon Jun 22 04:59:35 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

(Continued on next page)
Platform Notes (Continued)

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
2 "physical id"s (chips)
48 "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 : 24
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): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 1782.772
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47
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 pdpesgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmprefp pni pclmulqdq dtex64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrpi pdcid pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cmton fault epb cat_l3 cdp_l3
invpcid_single intel_pinn ssbd mba ibrs lbp lpt lbp lbrs lbrs enhanced tpr_shadow vmwi

(Continued on next page)
Dell Inc.

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Test Date: Jun-2020
Hardware Availability: Jul-2020
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Platform Notes (Continued)

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 xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occu1lp cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/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: 4 nodes (0-3)
node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44
node 0 size: 192074 MB
node 0 free: 190847 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45
node 1 size: 193533 MB
node 1 free: 193293 MB
data
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46
node 2 size: 193533 MB
node 2 free: 193042 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47
node 3 size: 193507 MB
node 3 free: 184629 MB
node distances:
node 0 1 2 3
0: 10 21 11 21
1: 21 10 21 11
2: 11 21 10 21
3: 21 11 21 10

From /proc/meminfo
MemTotal: 791192600 kB
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"
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)

(Continued on next page)
Dell Inc. PowerEdge R740xd (Intel Xeon Silver 4214R, 2.40 GHz)

**SPEC CPU®2017 Integer Rate Result**

Copyright 2017-2020 Standard Performance Evaluation Corporation

**SPECrate®2017_int_base = 160**
**SPECrate®2017_int_peak = 165**

<table>
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<tr>
<th>Test Date:</th>
<th>Jun-2020</th>
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<tr>
<td>Hardware Availability:</td>
<td>Jul-2020</td>
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<td>Apr-2020</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Platform Notes (Continued)**

```
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
Linux user-pc.spa.lab 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 Jun 22 04:57 last=5

SPEC is set to: /mnt/ramdisk/cpu2017-ic19.1u1
```

Filesystem Type Size Used Avail Use% Mounted on
,tmpfs tmpfs 225G 4.3G 221G 2% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.7 05/04/2020
Vendor: Dell Inc.
Product: PowerEdge R740xd
Product Family: PowerEdge
Serial: F5BMCS2

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:
- 19x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
- 4x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933

(End of data from sysinfo program)
### Compiler Version Notes

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>C</strong></td>
<td>502.gcc_r(peak)</td>
</tr>
<tr>
<td>Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304</td>
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<tr>
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<th>Notes</th>
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<tbody>
<tr>
<td><strong>C</strong></td>
<td>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base)</td>
</tr>
<tr>
<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304</td>
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<td><strong>C</strong></td>
<td>500.perlbench_r(peak) 557.xz_r(peak)</td>
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<tr>
<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306</td>
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## Compiler Version Notes (Continued)

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<th>Compiler/Tests</th>
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<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304</td>
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<td>Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304</td>
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<td>Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306</td>
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<tr>
<td>Fortran</td>
<td>548.exchange2_r(base, peak)</td>
</tr>
</tbody>
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Base Compiler Invocation

C benchmarks:
icc
C++ benchmarks:
icpc
Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
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 -qnextgen -std=c11
-W1, -plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -fto -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 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -fto -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 -ipo -no-prec-div -qopt-mem-layout-trans=4

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

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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
-                 
-                 
-                 

**Peak Compiler Invocation**

C benchmarks:

```plaintext
icc
```

C++ benchmarks:

```plaintext
icpc
```

Fortran benchmarks:

```plaintext
ifort
```

**Peak Portability Flags**

```plaintext
500.perlbench_r: -DSPEC_LP64  -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
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
```

**Peak Optimization Flags**

```plaintext
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -03 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

(Continued on next page)
Peak Optimization Flags (Continued)

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl,-m32-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -m64 -qnextgen -std=c11
-Wl,-m32-branches-within-32B-boundaries
-Wl,-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: -Wl,-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
## Dell Inc.

**PowerEdge R740xd (Intel Xeon Silver 4214R, 2.40 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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<tr>
<td>SPECrate®2017_int_peak</td>
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### CPU2017 License: 55

**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Jun-2020  
**Hardware Availability:** Jul-2020  
**Software Availability:** Apr-2020

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.

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