## SPEC® CPU2017 Integer Rate Result

**Dell Inc.**

PowerEdge R640 (Intel Xeon Silver 4214 2.20GHz)

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<td>SPECrate2017_int_peak</td>
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### Hardware

- **CPU Name:** Intel Xeon Silver 4214
- **Max MHz.:** 3200
- **Nominal:** 2200
- **Enabled:** 24 cores, 2 chips, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

### Software

- **OS:** Ubuntu 18.04.2 LTS
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
  Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel:** No
- **Firmware:** Version 2.1.5 released Feb-2019
- **File System:** ext4
- **System State:** Run level 3 (multi user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator V5.0.1
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CPU2017 License: 55
Test Sponsor: Dell Inc.
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SPECrate2017_int_base = 133
SPECrate2017_int_peak = 138

Results Table

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

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
Yes: 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.
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>

(Continued on next page)
General Notes (Continued)

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:
ADDC setting disabled
Sub NUMA Cluster enabled
Virtualization Technology disabled
DCU Streamer Prefetcher enabled
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 disabled
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on olu Thu Mar 7 16:00:26 2019

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 : Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
  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

(Continued on next page)
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Hardware Availability: Apr-2019
Software Availability: Feb-2019

Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2962.147
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46
NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47
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 pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf pni pclmulqdq dtes64.monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrm pam cmic dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave f16c rdrand
lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs
ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 rome invpcl homd rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
xsavec cqm_llc cqm_ocup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku
ospke avx512_vnni 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: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
node 0 size: 95145 MB
node 0 free: 94386 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
node 1 size: 96762 MB
node 1 free: 96228 MB
node distances:
node 0 1
0: 10 21

(Continued on next page)
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Platform Notes (Continued)

1: 21 10

From /proc/meminfo
MemTotal: 196514312 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS

From /etc/*release*/etc/*version*
debian_version: buster/sid
os-release:
NAME="Ubuntu"
VERSION="18.04.2 LTS (Bionic Beaver)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 18.04.2 LTS"
VERSION_ID="18.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
Linux olu 4.15.0-46-generic #49-Ubuntu SMP Wed Feb 6 09:33:07 UTC 2019 x86_64 x86_64
x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 3 Mar 7 15:51

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 53G 364G 13% /

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.

BIOS Dell Inc. 2.1.5 02/23/2019
Memory:
12x 002C0632002C 18ASF2G72PD2-2G9E1 16 GB 2 rank 2933, configured at 2400
12x Not Specified Not Specified
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Platform Notes (Continued)
(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  502.gcc_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
  525.x264_r(base, peak) 557.xz_r(base, peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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CXXC 523.xalancbmk_r(peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
CXXC 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base,
  peak) 541.leela_r(base, peak)
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### Compiler Version Notes (Continued)

FC 548.exchange2_r(base, peak)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64, Version 19.0.1.144 Build 20181018

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

**C benchmarks:**

```
icc -m64 -std=c11
```

**C++ benchmarks:**

```
icpc -m64
```

**Fortran benchmarks:**

```
ifort -m64
```

---

### Base Portability Flags

500.perlbmk_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:**

```
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc
```

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

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64 -std=c11


C++ benchmarks (except as noted below):
icpc -m64

523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/ia32_lin

Fortran benchmarks:
ifort -m64

Peak Portability Flags

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: -D_FILE_OFFSET_BITS=64 -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
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## Peak Optimization Flags

### C benchmarks:

500.perlbench_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -o3 -no-prec-div -qopt-mem-layout-trans=4 -fno-strict-overflow -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

502.gcc_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -o3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib -ljemalloc`

505.mcf_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -o3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

525.x264_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -o3 -no-prec-div -qopt-mem-layout-trans=4 -fno-alias -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

557.xz_r: Same as 505.mcf_r

### C++ benchmarks:

520.omnetpp_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -o3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc`

523.xalancbmk_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -o3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib -ljemalloc`

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

### Fortran benchmarks:

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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 CPU2017 v1.0.5 on 2019-03-07 11:00:25-0500.