Dell Inc.  
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

**SPEC CPU®2017 Integer Rate Result**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td>138</td>
</tr>
</tbody>
</table>

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

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Silver 4214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz</td>
<td>3200</td>
</tr>
<tr>
<td>Nominal</td>
<td>2200</td>
</tr>
<tr>
<td>Enabled</td>
<td>24 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2933P-R, running at 2400)</td>
</tr>
<tr>
<td>Storage</td>
<td>480 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>OS</th>
<th>Ubuntu 18.04.2 LTS 4.15.0-45-generic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 2.2.11 released Jun-2019</td>
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<tr>
<td>File System</td>
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<tr>
<td>System State</td>
<td>Run level 5 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management</td>
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</table>
SPECCPU®2017 Integer Rate Result

Dell Inc.
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

SPECrate®2017_int_base = 132
SPECrate®2017_int_peak = 138

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Results Table

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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>perfbench_r</td>
<td>48</td>
<td>781</td>
<td>97.9</td>
<td>771</td>
<td>99.1</td>
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<td>gcc_r</td>
<td>48</td>
<td>619</td>
<td>110</td>
<td>625</td>
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<td>mcf_r</td>
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<td>441</td>
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<td>omnetpp_r</td>
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<td>90.0</td>
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<td>xalancbmk_r</td>
<td>48</td>
<td>332</td>
<td>153</td>
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<tr>
<td>x264_r</td>
<td>48</td>
<td>700</td>
<td>99.1</td>
<td>700</td>
<td>99.1</td>
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<tr>
<td>deepsjeng_r</td>
<td>48</td>
<td>508</td>
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<td>108</td>
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<tr>
<td>leela_r</td>
<td>48</td>
<td>787</td>
<td>101</td>
<td>802</td>
<td>99.1</td>
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<tr>
<td>exchange2_r</td>
<td>48</td>
<td>477</td>
<td>263</td>
<td>478</td>
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<tr>
<td>xz_r</td>
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<td>584</td>
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<td>88.8</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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.:
umactl --interleave=all runcpu <etc>
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)
Dell Inc. Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 132
SPECrate®2017_int_peak = 138

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

| Test Date: | Sep-2019 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | May-2019 |

General Notes (Continued)

is mitigated in the system as tested and documented.
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:
ADDDC setting disabled
Sub NUMA Cluster disabled
Virtualization Technology disabled
DCU Streamer Prefetcher 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 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 intel-sut Tue Sep 3 20:52:55 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

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

Dell Inc.
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

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SPECrate®2017_int_base = 132
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Sep-2019
Tested by: Dell Inc.
Hardware Availability: Apr-2019
Software Availability: May-2019

Platform Notes (Continued)

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 4214 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 1829.077
BogoMIPS: 4400.00
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 pdpeslb rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrr pdcm pcid dca ssse4_1 ssse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand
lahf_lm abm 3nowprefetch cpuid_fault epb cat_13 cdp_13 invpcid_single intel_ppin
ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmni flexpriority ept vpid
fsbsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f
avx512dq rdseed adx clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

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: 95148 MB
  node 0 free: 94928 MB
  node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45
  node 1 size: 96765 MB
  node 1 free: 96513 MB
  node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46
  node 2 size: 97644 KB

(Continued on next page)
Dell Inc.
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 132
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<th>CPU2017 License: 55</th>
<th>Test Date: Sep-2019</th>
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<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: May-2019</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

node 2 free: 96524 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47
node 3 size: 96764 MB
node 3 free: 96562 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: 394673368 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /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 intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 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 5 Sep 3 20:47

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 21G 396G 5% /

(Continued on next page)
Platform Notes (Continued)

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. 2.2.11 06/14/2019
Memory:
12x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
 Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(base, peak) 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, Version 19.0.4.227 Build 20190416
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
 Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(base, peak) 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, Version 19.0.4.227 Build 20190416
 Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

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

C++     | 523.xalancbmk_r(peak)
---------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
---------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++     | 523.xalancbmk_r(peak)
---------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
---------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

| SPECrate®2017_int_base = 132 |
| SPECrate®2017_int_peak = 138 |

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Sep-2019
- **Hardware Availability:** Apr-2019
- **Software Availability:** May-2019

## Base Compiler Invocation

- **C benchmarks:**
  - `icc -m64 -std=c11`
- **C++ benchmarks:**
  - `icpc -m64`
- **Fortran benchmarks:**
  - `ifort -m64`

## 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:**
  - `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`
- **C++ benchmarks:**
  - `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`
- **Fortran benchmarks:**
## Dell Inc.
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20GHz)

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

### SPECrate®2017_int_base = 132
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### Test Date: Sep-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

## 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_2019.4.227/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

## 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_2019.4.227/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
```

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

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

Test Date: Sep-2019
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Software Availability: May-2019

Peak Optimization Flags (Continued)

505.mcf_r (continued):
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/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_2019.4.227/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_2019.4.227/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:
-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_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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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<th>CPU2017 License</th>
<th>Dell Inc.</th>
<th>Test Date</th>
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<td>Sep-2019</td>
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<td>May-2019</td>
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</tbody>
</table>

SPEC CPU®2017 Integer Rate Result

Dell Inc.
Dell PowerEdge R540 (Intel Xeon Silver 4214, 2.20 GHz)

SPECrate®2017_int_base = 132
SPECrate®2017_int_peak = 138

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.