**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

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<th>SPECrate®2017_int_peak = 276</th>
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<td>520.omnetpp_r</td>
<td>64</td>
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<tr>
<td>523.xalancbmk_r</td>
<td>64</td>
<td>541</td>
</tr>
<tr>
<td>525.x264_r</td>
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<td>557</td>
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<td>557.xz_r</td>
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</table>

**CPU2017 License:** 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Jun-2020

Hardware Availability: Jul-2020

Software Availability: Apr-2020

**CPU Name:** Intel Xeon Gold 6246R

Max MHz: 4100

Nominal: 3400

Enabled: 32 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: 35.75 MB I+D on chip per chip

Other: None

Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933V-R, running at 2933)

Storage: 1 x 1.92 TB SATA SSD

Other: None

**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.
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

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

SPECrate®2017_int_base = 266
SPECrate®2017_int_peak = 276

Results Table

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</tbody>
</table>

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

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"

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

Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

SPECrater®2017_int_base = 266
SPECrater®2017_int_peak = 276

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

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

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 numacl I e.: numacl --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
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 /mnt/ramdisk/cpu2017-ic19.lul/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed688a646a485a0011
running on user-pc.spa.lab Tue Jun  2 07:11:34 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)
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

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

SPECrates®2017

SPECrates®2017_int_base = 266
SPECrates®2017_int_peak = 276

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

Platform Notes (Continued)

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 6246R CPU @ 3.40GHz
  2 "physical id"s (chips)
  64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 13 16 17 18 19 21 24 28 29
physical 1: cores 0 1 2 6 12 13 16 17 18 19 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6246R CPU @ 3.40GHz
Stepping: 7
CPU MHz: 3828.657
CPU max MHz: 4100.0000
CPU min MHz: 1200.0000
BogoMIPS: 6800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
NUMA node1 CPU(s): 1,5,7,13,17,21,25,29,33,37,39,45,49,53,57,61
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
NUMA node3 CPU(s): 3,9,11,15,19,23,27,31,35,41,43,47,51,55,59,63
Flags: fpu vme de pse tsc msr pae mce cmov 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 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi

(Continued on next page)
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECraten project summary

Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

SPECraten®2017_int_base = 266

SPECraten®2017_int_peak = 276

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Jun-2020
Hardware Availability: Jul-2020
Software Availability: Apr-2020

Platform Notes (Continued)

flexpriority ept vpid fsqgsbase 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 xsaves cqm_llc cqm_occup_llc 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 : 36608 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 48 52 56 60
  node 0 size: 192072 MB
  node 0 free: 191478 MB
  node 1 cpus: 1 5 7 13 17 21 25 29 33 37 39 45 49 53 57 61
  node 1 size: 193532 MB
  node 1 free: 193202 MB
  node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
  node 2 size: 193507 MB
  node 2 free: 183840 MB
  node 3 cpus: 3 9 11 15 19 23 27 31 35 41 43 47 51 55 59 63
  node 3 size: 193532 MB
  node 3 free: 193314 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: 791188312 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 Gold 6246R, 3.40 GHz)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECratio®2017_int_base = 266
SPECratio®2017_int_peak = 276

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

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

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 sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling

run-level 3 Jun 2 07:08 last=5

SPEC is set to: /mnt/ramdisk/cpu2017-ic19.1u1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 225G 4.2G 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

==============================================================================
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.
-----------------------------------------------------------------------------

==============================================================================
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       | 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.
-----------------------------------------------------------------------------

==============================================================================
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.
==============================================================================

(Continued on next page)
**Dell Inc.**

PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)  

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<th>CPU2017 License:</th>
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<td>Hardware Availability:</td>
<td>Jul-2020</td>
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**SPEC CPU®2017 Integer Rate Result**

**SPECrate®2017_int_base = 266**

**SPECrate®2017_int_peak = 276**

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**Compiler Version Notes (Continued)**

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<table>
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<th>C</th>
<th>502.gcc_r(peak)</th>
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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.

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<table>
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<th>C</th>
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Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304

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---

<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306

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<table>
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<th>C++</th>
<th>520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)</th>
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Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304

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---

<table>
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<th>Fortran</th>
<th>548.exchange2_r(base, peak)</th>
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</thead>
</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306

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Dell Inc.
PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

SPEC® CPU®2017 Integer Rate Result

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</table>

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

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
-Wl,-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
-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

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

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**SPEC CPU®2017 Integer Rate Result**

<table>
<thead>
<tr>
<th>Dell Inc.</th>
<th>SPECrate®2017_int_base = 266</th>
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<td>CPU2017 License</td>
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<td>Tested by</td>
<td>Dell Inc.</td>
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<td>Hardware Availability</td>
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<tr>
<td>Software Availability</td>
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</table>

## Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `nostandard-realloc-lhs`
- `-align array32byte`
- `-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`

Fortran benchmarks:
- `ifort`

## 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: `-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

C benchmarks:
- `500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)`
- `-xcORE-AVX512 -ipo -O3 -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)
SPEC CPU®2017 Integer Rate Result

Dell Inc. PowerEdge R740xd (Intel Xeon Gold 6246R, 3.40 GHz)

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

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, -plugin-opt=-x86-branches-within-32B-boundaries
-Wl, -z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.proffdata(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, -plugin-opt=-x86-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
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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-icl19.1u1-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.

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