SPEC CPU®2017 Integer Rate Result

Dell Inc.
PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

SPECrate®2017_int_base = 113
SPECrate®2017_int_peak = 118

Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

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

Test Date: Jun-2020
Hardware Availability: Feb-2020

Software Availability: Apr-2020

| Copies | 0 | 10.0 | 25.0 | 40.0 | 55.0 | 70.0 | 85.0 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 |
|--------|---|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 32 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 | 76.6 |
| 502.gcc_r | 32 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 | 88.1 |
| 505.mcf_r | 32 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 |
| 520.omnetpp_r | 32 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 | 66.5 |
| 531.deepsjeng_r | 32 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 | 245 |
| 548.exchange2_r | 32 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 | 236 |
| 557.xz_r | 32 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 | 63.9 |

SPECrate®2017_int_base (113) --- SPECrate®2017_int_peak (118)

Hardware

CPU Name: Intel Xeon Gold 6208U
Max MHz: 3900
Nominal: 2900
Enabled: 16 cores, 1 chip, 2 threads/core
Orderable: 1 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 22 MB I+D on chip per chip
Other: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933V-R, running at 2933)
Storage: 1 x 1.92 TB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.1
g 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: None
jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage
Dell Inc.  

PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)  

**SPEC CPU®2017 Integer Rate Result**

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

**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"
```
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

| SPECrate®2017_int_base = 113 |
| SPECrate®2017_int_peak = 118 |

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

Test Date: Jun-2020
Hardware Availability: Feb-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 numactl i.e.:
numactl --interleave=all runcpu <etc>
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
PCl 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 295195f888a3d7edbe1e6e46a485a0011
running on rhel-8-1-sut Sat Jun 6 10:32:03 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) Gold 6208U CPU @ 2.90GHz
  - 1 "physical id"s (chips)
  - 32 "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 7 8 9 10 11 12 13 14 15

From `lscpu`:

- **Architecture**: x86_64
- **CPU op-mode(s)**: 32-bit, 64-bit
- **Byte Order**: Little Endian
- **CPU(s)**: 32
- **On-line CPU(s) list**: 0-31
- **Thread(s) per core**: 2
- **Core(s) per socket**: 16
- **Socket(s)**: 1
- **NUMA node(s)**: 2
- **Vendor ID**: GenuineIntel
- **CPU family**: 6
- **Model**: 85
- **Model name**: Intel(R) Xeon(R) Gold 6208U CPU @ 2.90GHz
- **Stepping**: 7
- **CPU MHz**: 3497.919
- **CPU max MHz**: 3900.0000
- **CPU min MHz**: 1200.0000
- **BogoMIPS**: 5800.00
- **Virtualization**: VT-x
- **L1d cache**: 32K
- **L1i cache**: 32K
- **L2 cache**: 1024K
- **L3 cache**: 22528K
- **NUMA node0 CPU(s)**: 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
- **NUMA node1 CPU(s)**: 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
- **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 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pjn ssbd mba ibrs ibpb stibp ibrs_enabled tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmp mx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaveopt xsaves cmxllc cmx_occult llc cmx_mbm_total cmx_mbm_local dtherm ida arat pni pku ospke avx512_vnni md_clear flush_l1d

(Continued on next page)
Dell Inc.  
PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)  

SPEC CPU®2017 Integer Rate Result  

Copyright 2017-2020 Standard Performance Evaluation Corporation  

Dell Inc.  

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

SPECrate®2017_int_base = 113  
SPECrate®2017_int_peak = 118  

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

Platform Notes (Continued)  

arch_capabilities  

/proc/cpuinfo cache data  
cache size : 22528 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  
node 0 size: 95306 MB  
node 0 free: 86045 MB  
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31  
node 1 size: 96738 MB  
node 1 free: 96134 MB  
node distances:  
node 0 1  
0: 10 11  
1: 11 10  

From /proc/meminfo  
MemTotal: 196654116 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)  
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga  

uname -a:  
Linux rhel-8-1-sut 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  

(Continued on next page)
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)  

SPECrate®2017_int_base = 113  
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CPU2017 License: 55  
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Platform Notes (Continued)

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 6 10:28 last=5

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

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 150G 4.3G 146G 3% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.7 05/04/2020
Vendor: Dell Inc.
Product: PowerEdge R640
Product Family: PowerEdge
Serial: FPFXCH2

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:
6x 002C069D002C 18ASF2G72PD2-2G9E1 16 GB 2 rank 2933
4x 00AD0B0300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
2x 00AD063200AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
12x Not Specified Not Specified

(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)

(Continued on next page)
## Dell Inc.

**PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)**

### SPEC CPU® 2017 Integer Rate Result

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### Compiler Version Notes (Continued)

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.

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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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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<table>
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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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<tr>
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NextGen Build 20200304
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<table>
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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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.
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

SPECrated®2017_int_base = 113
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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

Compiler Version Notes (Continued)

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++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

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.

Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran 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.

Base Compiler Invocation

C benchmarks: icc
C++ benchmarks: icpc
Fortran benchmarks: ifort
**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**
Dell Inc.  

**PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)**

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</tbody>
</table>

**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 -qnxtgen -std=c11  
- Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
- xCORE-AVX512 -O3 -ffast-math -flto -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 -qnxtgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries  
- Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -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  
- nostandard-realloc-lhs -align array32byte -auto  
- 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

(Continued on next page)
### Dell Inc. PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

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- 55 SpecCPU2017 License
- Test Sponsor: Dell Inc.
- Tested by: Dell Inc.

#### Peak Compiler Invocation (Continued)

- **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: -W1, -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
  - -mbbranches-within-32B-boundaries
  - -L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
  - -ljemalloc

  - 502.gcc_r: -m32
  - -L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin
  - -std=gnu89
  - -W1, -plugin-opt=-x86-branches-within-32B-boundaries
  - -W1, -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

(Continued on next page)
Dell Inc.  
PowerEdge R640 (Intel Xeon Gold 6208U, 2.90 GHz)

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

Peak Optimization Flags (Continued)

525.x264_r: -m64 -qnextgen -std=c11  
-W1,-plugin-opt=-x86-branches-within-32B-boundaries  
-W1,-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: -W1,-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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

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