Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)

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

SPECspeed2017_int_base = 9.83
SPECspeed2017_int_peak = 10.0

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>40</td>
</tr>
<tr>
<td>gcc</td>
<td>40</td>
</tr>
<tr>
<td>mcf</td>
<td>40</td>
</tr>
<tr>
<td>omnetpp</td>
<td>40</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>40</td>
</tr>
<tr>
<td>x264</td>
<td>40</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>40</td>
</tr>
<tr>
<td>leela</td>
<td>40</td>
</tr>
<tr>
<td>exchange2</td>
<td>40</td>
</tr>
<tr>
<td>xz</td>
<td>40</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6230T
Max MHz.: 3900
Nominal: 2100
Enabled: 40 cores, 2 chips
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: 27.5 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
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: Yes
Firmware: Version 2.1.8 released Apr-2019
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
### Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)

**SPECspeed2017_int_base = 9.83**

**SPECspeed2017_int_peak = 10.0**

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<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>268</td>
<td>6.61</td>
<td>274</td>
<td>6.49</td>
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<td>6.56</td>
<td>40</td>
<td>229</td>
<td>7.76</td>
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<td>7.75</td>
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<td>7.70</td>
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<tr>
<td>602.gcc_s</td>
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<td>419</td>
<td>9.50</td>
<td>422</td>
<td>9.43</td>
<td>40</td>
<td>415</td>
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<td>411</td>
<td>9.69</td>
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<td>9.82</td>
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<tr>
<td>605.mcf_s</td>
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<td>388</td>
<td>12.2</td>
<td>40</td>
<td>396</td>
<td>11.9</td>
<td>395</td>
<td>12.0</td>
<td>387</td>
<td>12.2</td>
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<tr>
<td>620.omnetpp_s</td>
<td>40</td>
<td>200</td>
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<td>202</td>
<td>8.07</td>
<td>200</td>
<td>8.15</td>
<td>40</td>
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<td>12.5</td>
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<td>12.4</td>
<td>40</td>
<td>115</td>
<td>12.4</td>
<td>115</td>
<td>12.3</td>
<td>114</td>
<td>12.5</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>40</td>
<td>122</td>
<td>14.4</td>
<td>123</td>
<td>14.3</td>
<td>123</td>
<td>14.4</td>
<td>40</td>
<td>123</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
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<td>5.47</td>
<td>262</td>
<td>5.46</td>
<td>262</td>
<td>5.47</td>
<td>40</td>
<td>262</td>
<td>5.46</td>
<td>262</td>
<td>5.47</td>
<td>262</td>
<td>5.47</td>
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<tr>
<td>641.leela_s</td>
<td>40</td>
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<td>4.77</td>
<td>358</td>
<td>4.77</td>
<td>358</td>
<td>4.77</td>
<td>40</td>
<td>358</td>
<td>4.77</td>
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<td>4.77</td>
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<td>4.77</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
<td>295</td>
<td>20.9</td>
<td>292</td>
<td>21.2</td>
<td>294</td>
<td>21.0</td>
<td>40</td>
<td>293</td>
<td>21.1</td>
<td>292</td>
<td>21.2</td>
<td>293</td>
<td>21.1</td>
</tr>
</tbody>
</table>

**Results 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/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

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>
```

(Continued on next page)
## SPEC CPU2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Dell Inc.</th>
<th>SPECspeed2017_int_base = 9.83</th>
</tr>
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<tbody>
<tr>
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<td>SPECspeed2017_int_peak = 10.0</td>
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<th>CPU2017 License: 55</th>
<th>Test Date: Mar-2019</th>
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<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Feb-2019</td>
</tr>
</tbody>
</table>

### General Notes (Continued)


### Platform Notes

- BIOS settings:
  - ADDDC 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 disabled
  - CPU Interconnect Bus Link Power Management disabled
  - PCI ASPM L1 Link Power Management disabled

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- 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 disabled
- 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 Thu May 2 22:17:49 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) Gold 6230T CPU @ 2.10GHz
  2 "physical id"s (chips)
  40 "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 : 20
siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
```

(Continued on next page)
# SPEC CPU2017 Integer Speed Result

## Dell Inc.

#### PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)

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</tr>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>SPECspeed2017_int_base</td>
<td>9.83</td>
</tr>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**Test Date:** Mar-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### Platform Notes (Continued)

```
Thread(s) per core:  1
Core(s) per socket:  20
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Gold 6230T CPU @ 2.10GHz
Stepping:            7
CPU MHz:             3598.594
BogoMIPS:            4200.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            28160K
NUMA node0 CPU(s):   0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38
NUMA node1 CPU(s):   1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39
Flags:               fpv vme de pse tsc msr pae mce 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 aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdg_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vt vipl fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts 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_occp_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: 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
node 0 size: 191913 MB
node 0 free: 191492 MB
node 1 cpus:  1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
node 1 size: 193531 MB
node 1 free: 193114 MB
node distances:
  node   0   1
  0:   21
  1:   10
```

(Continued on next page)
## Platform Notes (Continued)

### From /proc/meminfo

<table>
<thead>
<tr>
<th>MemTotal:</th>
<th>394695512 kB</th>
</tr>
</thead>
<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

### From /usr/bin/lsb_release -d

Ubuntu 18.04.2 LTS

### From /etc/*release* /etc/*version*

- **debian_version**: buster/sid
- **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

```bash
/home/cpu2017
```

**unname -a:**

```bash
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 May 2 22:12**

**SPEC is set to:** /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>ext4</td>
<td>439G</td>
<td>20G</td>
<td>398G</td>
<td>5%</td>
<td>/</td>
</tr>
</tbody>
</table>

**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. 2.1.8 04/30/2019
- **Memory:**
  - 1x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
  - 4x Not Specified Not Specified

(End of data from sysinfo program)
## Dell Inc.  
**PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)**

<table>
<thead>
<tr>
<th>Spec Speed2017 Int Base</th>
<th>Spec Speed2017 Int Peak</th>
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<tr>
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</table>

### Compiler Version Notes

```
==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base,  
  peak) 657.xz_s(base)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------

==============================================================================
CC   600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------

==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base,  
  peak) 641.leela_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ 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.
------------------------------------------------------------------------------

==============================================================================
CXXC 620.omnetpp_s(peak)
------------------------------------------------------------------------------
Intel(R) C++ 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.
------------------------------------------------------------------------------

==============================================================================
FC  648.exchange2_s(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
```

(Continued on next page)
**SPEC CPU2017 Integer Speed Result**

**Dell Inc.**

**PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)**

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**Software Availability:** Feb-2019

**Base Compiler Invocation (Continued)**

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

**Base Portability Flags**

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64  
602.gcc_s: -DSPEC_LP64  
605.mcf_s: -DSPEC_LP64  
620.omnetpp_s: -DSPEC_LP64  
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX  
625.x264_s: -DSPEC_LP64  
631.deepsjeng_s: -DSPEC_LP64  
641.leela_s: -DSPEC_LP64  
648.exchange2_s: -DSPEC_LP64  
657.xz_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc

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

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs
### SPEC CPU2017 Integer Speed Result

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)  

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#### Peak Compiler Invocation

**C benchmarks:**
```bash
c -m64 -std=c11
```

**C++ benchmarks:**
```bash
cpc -m64
```

**Fortran benchmarks:**
```bash
ifort -m64
```

#### Peak Portability Flags

Same as Base Portability Flags

#### Peak Optimization Flags

**C benchmarks:**
```bash
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
-xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp  
-DSPEC_OPENMP -fno-strict-overflow  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```bash
602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
-xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```bash
605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4  
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```bash
625.x264_s: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```bash
657.xz_s: -Wl,-z,muldefs -xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp  
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc
```

(Continued on next page)
Dell Inc.
PowerEdge C6420 (Intel Xeon Gold 6230T, 2.10GHz)

SPEC CPU2017 Integer Speed Result

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

Peak Optimization Flags (Continued)

C++ benchmarks:

620.omnetpp_s:
- Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
- xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
- DSPEC_SUPPRESS_OPENMP
- /usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- lqkmalloc

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

631.deepsjeng_s: Same as 623.xalancbmk_s

641.leela_s: Same as 623.xalancbmk_s

Fortran benchmarks:

- xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
- nostandard-realloc-lhs

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.

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