## SPEC CPU®2017 Integer Speed Result

### Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6248R, 3.00 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5</td>
<td>11.7</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** Jun-2020

**Hardware Availability:** Jul-2020

**Software Availability:** Apr-2020

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Cores</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base (11.5)</th>
<th>SPECspeed®2017_int_peak (11.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>48</td>
<td>600</td>
<td>6.86</td>
<td>7.38</td>
</tr>
<tr>
<td>gcc</td>
<td>48</td>
<td>602</td>
<td>10.6</td>
<td>10.8</td>
</tr>
<tr>
<td>mcf</td>
<td>48</td>
<td>605</td>
<td>11.0</td>
<td>11.5</td>
</tr>
<tr>
<td>omnetpp</td>
<td>48</td>
<td>620</td>
<td>10.8</td>
<td>12.6</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>48</td>
<td>623</td>
<td>13.9</td>
<td>14.6</td>
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<tr>
<td>x264</td>
<td>48</td>
<td>625</td>
<td>16.4</td>
<td>17.0</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>48</td>
<td>631</td>
<td>5.92</td>
<td>6.86</td>
</tr>
<tr>
<td>leela</td>
<td>48</td>
<td>641</td>
<td>4.90</td>
<td>5.56</td>
</tr>
<tr>
<td>exchange2</td>
<td>48</td>
<td>648</td>
<td>16.9</td>
<td>24.2</td>
</tr>
<tr>
<td>xz</td>
<td>48</td>
<td>657</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Gold 6248R

**Max MHz:** 4000

**Nominal:** 3000

**Enabled:** 48 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:** 35.75 MB I+D on chip per chip

**Other:** None

**Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)

**Storage:** 1 x 1.92 TB SATA SSD

**Other:** None

**OS:** Red Hat Enterprise Linux 8.1

**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:** Yes

**Firmware:** Version 2.7.7 released May-2020

**File System:** tmpfs

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** 64-bit

**Other:** jemalloc memory allocator V5.0.1

**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>48</td>
<td>258</td>
<td>6.87</td>
<td>259</td>
<td>6.86</td>
<td>259</td>
<td>6.85</td>
<td>48</td>
<td>226</td>
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<tr>
<td>602.gcc_s</td>
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<td>10.6</td>
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<td>360</td>
<td>11.0</td>
<td>364</td>
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<tr>
<td>605.mcf_s</td>
<td>48</td>
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<td>18.7</td>
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<td>251</td>
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<td>620.omnetpp_s</td>
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<td>155</td>
<td>10.5</td>
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<td>10.9</td>
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<td>155</td>
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<td>150</td>
<td>10.9</td>
<td>150</td>
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<td>623.xalanchmk_s</td>
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<td>102</td>
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<td>108</td>
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<td>17.0</td>
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<td>4.90</td>
<td>348</td>
<td>4.90</td>
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<td>255</td>
<td>24.2</td>
<td>256</td>
<td>24.2</td>
<td>255</td>
<td>24.2</td>
<td>48</td>
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<td>24.2</td>
<td>256</td>
<td>24.2</td>
<td>255</td>
</tr>
</tbody>
</table>

Specspeed®2017_int_base = 11.5
Specspeed®2017_int_peak = 11.7

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

## 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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-ic19.1u1/lib/intel64:/mnt/ramdisk/cpu2017-ic19.1u1/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

## 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)
General Notes (Continued)

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
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 disabled
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 disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch disabled
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 295195f888a3d7ed1e6e46a485a0011
running on user-pc.spa.lab Thu Jun 4 05:43:27 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

From /proc/cpuinfo
    model name : Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
        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.)

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

- **cpu cores:** 24
- **siblings:** 24

**Physical 0:**
- cores: 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

**Physical 1:**
- cores: 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 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):** 48
- **On-line CPU(s) list:** 0-47
- **Thread(s) per core:** 1
- **Core(s) per socket:** 24
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
- **Stepping:** 7
- **CPU MHz:** 3467.472
- **CPU max MHz:** 4000.0000
- **CPU min MHz:** 1200.0000
- **BogoMIPS:** 6000.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 36608K
- **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 pdemsg rdtescp lm constant_tsc art 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 xtrpr pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebpf cat_l3 cdp_l3

```
invpcid_single intel_pplin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnni
flexpriority upt vpid faqsbase 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 xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local dtherm ida arat pln pts pkp ospke avx512_vnni md_clear flush_l1d
arch_capabilities
```

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

PowerEdge R740xd (Intel Xeon Gold 6248R, 3.00 GHz)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
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<td>Dell Inc.</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 11.5**

**SPECspeed®2017_int_peak = 11.7**

---

**Platform Notes (Continued)**

```plaintext
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: 385581 MB
node 0 free: 376044 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: 387066 MB
node 1 free: 385861 MB
node distances:
  node 0 1
  0: 10 21
  1: 21 10
```

From /proc/meminfo

- MemTotal: 791191988 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)

```plaintext
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

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

**Dell Inc.**

PowerEdge R740xd (Intel Xeon Gold 6248R, 3.00 GHz)

---

**Platform Notes (Continued)**

pointersanitization

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

run-level 3 Jun 4 05:25 last=5

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

<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>tmpfs</td>
<td>tmpfs</td>
<td>225G</td>
<td>4.2G</td>
<td>221G</td>
<td>2%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

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 | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
  625.x264_s(base, peak) 657.xz_s(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.

==============================================================================
C | 600.perlbench_s(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)
**Compiler Version Notes (Continued)**

C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(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.
------------------------------------------------------------------------------

C       | 600.perlbench_s(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++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(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 | 648.exchange2_s(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
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**Test Date:** Jun-2020  
**Hardware Availability:** Jul-2020  
**Software Availability:** Apr-2020

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
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</tr>
<tr>
<td>657.xz_s</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### 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 -flto -mfpmath=sse -funroll-loops`
- `-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

**C++ benchmarks:**

- `-m64 -qnextgen -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 -xCORE-AVX512`
- `-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte`
- `-mbranches-within-32B-boundaries`

### Peak Compiler Invocation

**C benchmarks:**

`icc`

**C++ benchmarks:**

`icpc`

(Continued on next page)
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**SPECspeed®2017_int_base = 11.5**

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<td>Software Availability: Apr-2020</td>
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</tbody>
</table>

Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -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

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -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/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -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/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
Dell Inc.  

PowerEdge R740xd (Intel Xeon Gold 6248R, 3.00 GHz)  

SPECspeed®2017_int_base = 11.5  
SPECspeed®2017_int_peak = 11.7  

C++ benchmarks:
   620.omnetpp_s: basepeak = yes
   623.xalancbmk_s: basepeak = yes
   631.deepsjeng_s: basepeak = yes
   641.leela_s: basepeak = yes

Fortran benchmarks:
   648.exchange2_s: 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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Documentation:  

Software Availability: Apr-2020
Hardware Availability: Jul-2020
Test Date: Jun-2020
CPU2017 License: 55