Dell Inc.

PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)

SPECspeed2017_int_base = 8.98
SPECspeed2017_int_peak = 9.13

Hardware
CPU Name: Intel Xeon Gold 5222
Max MHz.: 3900
Nominal: 3800
Enabled: 8 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: 16.5 MB I+D on chip per chip
Other: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)
Storage: 1 x 960 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
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>290</td>
<td>6.12</td>
<td>289</td>
<td>6.13</td>
<td>288</td>
<td>6.15</td>
<td>16</td>
<td>248</td>
<td>7.15</td>
<td>251</td>
<td>7.07</td>
<td>248</td>
<td>7.16</td>
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<tr>
<td>602.gcc_s</td>
<td>16</td>
<td>460</td>
<td>8.66</td>
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<td>465</td>
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<tr>
<td>605.mcf_s</td>
<td>16</td>
<td>402</td>
<td>11.7</td>
<td>399</td>
<td>11.8</td>
<td>395</td>
<td>11.9</td>
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<td>11.7</td>
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<td>11.8</td>
<td>402</td>
<td>11.8</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>16</td>
<td>302</td>
<td>5.41</td>
<td>302</td>
<td>5.41</td>
<td>304</td>
<td>5.36</td>
<td>16</td>
<td>312</td>
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<td>5.24</td>
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<td>5.24</td>
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<tr>
<td>625.x264_s</td>
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<td>129</td>
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<td>128</td>
<td>13.8</td>
<td>128</td>
<td>13.8</td>
<td>16</td>
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<td>128</td>
<td>13.8</td>
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<td>631.deepsjeng_s</td>
<td>16</td>
<td>263</td>
<td>5.44</td>
<td>263</td>
<td>5.44</td>
<td>263</td>
<td>5.44</td>
<td>16</td>
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<td>5.44</td>
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<td>263</td>
<td>5.45</td>
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<tr>
<td>641.leea_s</td>
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<td>359</td>
<td>4.76</td>
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<td>4.76</td>
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<td>4.75</td>
<td>16</td>
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<td>4.75</td>
<td>358</td>
<td>4.76</td>
<td>359</td>
<td>4.76</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
<td>375</td>
<td>16.5</td>
<td>375</td>
<td>16.5</td>
<td>376</td>
<td>16.4</td>
<td>16</td>
<td>368</td>
<td>16.8</td>
<td>368</td>
<td>16.8</td>
<td>369</td>
<td>16.7</td>
</tr>
</tbody>
</table>

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

## 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:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

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
```

SPEC CPU2017 Integer Speed Result

Dell Inc.  
PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)  

<table>
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CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.  
Test Date: May-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019

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 9bcede6f2999c33d61f64985e45859ea9
running on intel-sut Fri May 24 16:46:28 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 5222 CPU @ 3.80GHz
  2 "physical id"s (chips)
  16 "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 : 4
siblings : 8
  physical 0: cores 5 8 9 13
  physical 1: cores 5 8 9 12
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Byte Order:           Little Endian
CPU(s):               16
On-line CPU(s) list:  0-15
Thread(s) per core:   2
Core(s) per socket:   4
Socket(s):            2
NUMA node(s):         4
Vendor ID:            GenuineIntel
CPU family:           6
Model:                85
```

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

**Dell Inc.**

**PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)**

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**SPECspeed2017_int_base = 8.98**

**SPECspeed2017_int_peak = 9.13**

---

**Platform Notes (Continued)**

Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz

Stepping: 6

CPU MHz: 1811.719

BogoMIPS: 7600.00

Virtualization: VT-x

L1d cache: 32K

L1i cache: 32K

L2 cache: 1024K

L3 cache: 16896K

NUMA node0 CPU(s): 0,6,8,14

NUMA node1 CPU(s): 1,3,9,11

NUMA node2 CPU(s): 2,4,10,12

NUMA node3 CPU(s): 5,7,13,15

Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp 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 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 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmcel flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrms 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_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

```
/platform/cpuinfo cache data
  cache size: 16896 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 6 8 14

node 0 size: 46786 MB

node 0 free: 46648 MB

node 1 cpus: 1 3 9 11

node 1 size: 48361 MB

node 1 free: 48215 MB

node 2 cpus: 2 4 10 12

node 2 size: 48383 MB

node 2 free: 48181 MB

node 3 cpus: 5 7 13 15

node 3 size: 48383 MB

node 3 free: 48076 MB

node distances:

node distances:

node 0 1 2 3

0: 10 21 11 21

1: 21 10 21 11

(Continued on next page)
Dell Inc.  
PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)  

**SPEC CPU2017 Integer Speed Result**  

<table>
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**Test Sponsor:** Dell Inc.  
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**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019  

Platform Notes (Continued)

2: 11 21 10 21  
3: 21 11 21 10

From /proc/meminfo

- MemTotal: 196520392 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/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 May 24 16:29

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>19G</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 002C0632002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933  
7x 002C069D002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933

(Continued on next page)
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)

**SPEC CPU2017 Integer Speed Result**

<table>
<thead>
<tr>
<th>Description</th>
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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Test Date:** May-2019

**Hardware Availability:** Apr-2019

**Tested by:** Dell Inc.

**Software Availability:** Feb-2019

**Platform Notes (Continued)**

4x 00AD069D00AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
12x Not Specified Not Specified

(End of data from sysinfo program)

**Compiler Version Notes**

```plaintext
==============================================================================
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
------------------------------------------------------------------------------
```

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

**Dell Inc.**

PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)

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

### Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>605.mcf_s</td>
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</tr>
<tr>
<td>620.omnetpp_s</td>
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<td>623.xalancbmk_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
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<tr>
<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### 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
```

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Dell Inc.  SPECspeed2017_int_base = 8.98  SPECspeed2017_int_peak = 9.13
PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)

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<tr>
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<td>Software Availability: Feb-2019</td>
</tr>
</tbody>
</table>

**Base Optimization Flags (Continued)**

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

**Peak Compiler Invocation**

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:

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

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

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

(Continued on next page)
Dell Inc.

PowerEdge R640 (Intel Xeon Gold 5222, 3.80GHz)

**SPEC CPU2017 Integer Speed Result**

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

---

**SPECspeed2017_int_base = 8.98**  
**SPECspeed2017_int_peak = 9.13**

---

**Peak Optimization Flags (Continued)**

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

657.xz_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
-ipo -O3  
-no-prec-div -DSPEC_SUPPRESS_OPENMP -gopenmp  
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

**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  
-L/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  
-L/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.

Tested with SPEC CPU2017 v1.0.5 on 2019-05-24 12:46:27-0400.  
Originally published on 2019-06-11.