## Dell Inc.

**PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base = 11.4</th>
<th>SPECspeed®2017_int_peak = 11.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>7.89</td>
<td>9.01</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>12.7</td>
<td>12.7</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>15.6</td>
<td>15.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>7.97</td>
<td>8.99</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>15.2</td>
<td>15.1</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>6.79</td>
<td>6.78</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.57</td>
<td>5.56</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>5.56</td>
<td>5.56</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>14.5</td>
<td>14.9</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>19.6</td>
<td>19.6</td>
</tr>
</tbody>
</table>

### CPU2017 License: 55

- **Test Date:** Jan-2020
- **Hardware Availability:** Dec-2018
- **Software Availability:** Jun-2019

### Hardware

- **CPU Name:** Intel Xeon E-2288G
- **Max MHz:** 5000
- **Nominal:** 3700
- **Enabled:** 8 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 16 MB I+D on chip per chip
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1
- **Kernel:** 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.1.6 released Sep-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

### Power Management

- **jemalloc memory allocator V5.0.1**
- **BIOS set to prefer performance at the cost of additional power usage.**
Dell Inc.

PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

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

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>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>8</td>
<td>225</td>
<td>7.89</td>
<td>224</td>
<td>7.91</td>
<td></td>
<td></td>
<td>8</td>
<td>196</td>
<td>9.06</td>
<td>197</td>
<td>9.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>8</td>
<td>314</td>
<td>12.7</td>
<td>313</td>
<td>12.7</td>
<td></td>
<td></td>
<td>8</td>
<td>312</td>
<td>12.8</td>
<td>314</td>
<td>12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>8</td>
<td>303</td>
<td>15.6</td>
<td>303</td>
<td>15.6</td>
<td></td>
<td></td>
<td>8</td>
<td>297</td>
<td>15.9</td>
<td>297</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8</td>
<td>205</td>
<td>7.97</td>
<td>204</td>
<td>8.01</td>
<td></td>
<td></td>
<td>8</td>
<td>199</td>
<td>8.18</td>
<td>202</td>
<td>8.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>8</td>
<td>92.5</td>
<td>15.3</td>
<td>93.5</td>
<td>15.2</td>
<td></td>
<td></td>
<td>8</td>
<td>92.6</td>
<td>15.3</td>
<td>93.9</td>
<td>15.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>8</td>
<td>98.0</td>
<td>18.0</td>
<td>98.2</td>
<td>18.0</td>
<td></td>
<td></td>
<td>8</td>
<td>97.6</td>
<td>18.1</td>
<td>97.9</td>
<td>18.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>8</td>
<td>211</td>
<td>6.80</td>
<td>211</td>
<td>6.79</td>
<td></td>
<td></td>
<td>8</td>
<td>211</td>
<td>6.79</td>
<td>211</td>
<td>6.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>8</td>
<td>306</td>
<td>5.57</td>
<td>306</td>
<td>5.57</td>
<td></td>
<td></td>
<td>8</td>
<td>306</td>
<td>5.57</td>
<td>307</td>
<td>5.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>8</td>
<td>150</td>
<td>19.6</td>
<td>150</td>
<td>19.6</td>
<td></td>
<td></td>
<td>8</td>
<td>150</td>
<td>19.6</td>
<td>151</td>
<td>19.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>8</td>
<td>426</td>
<td>14.5</td>
<td>426</td>
<td>14.5</td>
<td></td>
<td></td>
<td>8</td>
<td>414</td>
<td>14.9</td>
<td>414</td>
<td>14.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 11.4
SPECspeed®2017_int_peak = 11.6

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=finer,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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
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.
### Spec CPU®2017 Integer Speed Result

**Dell Inc.**

**PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.4</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_peak</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.6</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

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

**Test Date:** Jan-2020  
**Hardware Availability:** Dec-2018  
**Software Availability:** Jun-2019

---

### Platform Notes

Sysinfo program `/home/cpu2017/bin/sysinfo`  
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
running on linux-g3ob Tue Jan 28 12:18:36 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) E-2288G CPU @ 3.70GHz
- 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 : 8
  - siblings : 16
  - physical 0: cores 0 1 2 3 4 5 6 7

From `lscpu`:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 39 bits physical, 48 bits virtual
- CPU(s): 16
- On-line CPU(s) list: 0-15
- Thread(s) per core: 2
- Core(s) per socket: 8
- Socket(s): 1
- NUMA node(s): 1
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 158
- Model name: Intel(R) Xeon(R) E-2288G CPU @ 3.70GHz
- Stepping: 13
- CPU MHz: 3700.000
- BogoMIPS: 7392.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 256K
- L3 cache: 16384K
- NUMA node0 CPU(s): 0-15
- 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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3

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

Dell Inc.
PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

SPEC®2017_int_base = 11.4
SPEC®2017_int_peak = 11.6

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

| Test Date: | Jan-2020 |
| Hardware Availability: | Dec-2018 |
| Software Availability: | Jun-2019 |

Platform Notes (Continued)

```
sdbg fma cx16 xtpr pdcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnni flexpriority ept vpid fsqsbbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap cflushopt
intel_pt xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_lld
arch_capabilities

/proc/cpuinfo cache data
cache size : 16384 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 64131 MB
node 0 free: 63347 MB
distance:
node 0
0: 10

From /proc/meminfo
MemTotal: 65670280 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"
uname -a:
Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
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
```

(Continued on next page)
Dell Inc.

PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

SPECspeed®2017_int_base = 11.4
SPECspeed®2017_int_peak = 11.6

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

Test Date: Jan-2020
Hardware Availability: Dec-2018
Software Availability: Jun-2019

**Platform Notes (Continued)**

CVE-2017-5753 (Spectre variant 1):
Mitigation: __user pointer sanitization

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

run-level 3 Jan 28 12:15 last=5

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>xfs</td>
<td>440G</td>
<td>30G</td>
<td>411G</td>
<td>7%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

BIOS: Dell Inc. 2.1.6 09/27/2018
Vendor: Dell Inc.
Product: PowerEdge R340
Product Family: PowerEdge

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:
2x 00CE00000A02 M391A2K43BB1-CTD 16 GB 2 rank 2666
2x 00CE00000A07 M391A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

**Compiler Version Notes**

C       | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)
|---------------------------------------------------------------------------------------------------------------|
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 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++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Dell Inc.

PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

| SPECspeed®2017_int_base = 11.4 |
| SPECspeed®2017_int_peak = 11.6 |

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

Test Date: Jan-2020
Hardware Availability: Dec-2018
Software Availability: Jun-2019

Compiler Version Notes (Continued)

Fortran | 648.exchange2_s(base, peak)
---------|----------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 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

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-AVX2 -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-AVX2 -ipo -O3 -no-prec-div

(Continued on next page)
Dell Inc.

PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 11.4</th>
<th>Test Date: Jan-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak = 11.6</td>
<td>Hardware Availability: Dec-2018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tested by: Dell Inc.</th>
<th>Software Availability: Jun-2019</th>
</tr>
</thead>
</table>

### Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `-qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
- `-lqkmalloc`

Fortran benchmarks:
- `-xCORE-AVX2 -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-AVX2 -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-AVX2 -qopt-mem-layout-trans=4 -ipo -O3`
- `-no-prec-div -DSPEC_SUPPRESS_OPENMP`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

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

**Dell Inc.**  
PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>11.6</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55  
**Test Date:** Jan-2020  
**CPU2017 License:** 55  
**Hardware Availability:** Dec-2018  
**Tested by:** Dell Inc.  
**Software Availability:** Jun-2019  
**Test Sponsor:** Dell Inc.

### Peak Optimization Flags (Continued)

605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4  
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -qopenmp -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  
-xCORE-AVX2 -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

**C++ benchmarks:**

620.omnetpp_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4  
-DSPEC_SUPPRESS_OPENMP  
-L/usr/local/IntelCompiler19/compilers_and intéressions_2019.4.227/linux/compiler/lib/intel64  
-lqkmalloc

623.xalancbmk_s: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_interestions_2019.4.227/linux/compiler/lib/intel64  
-lqkmalloc

631.deepsjeng_s: Same as 623.xalancbmk_s

641.leela_s: Same as 623.xalancbmk_s

**Fortran benchmarks:**

-xCORE-AVX2 -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:

# SPEC CPU® 2017 Integer Speed Result

**Dell Inc.**

PowerEdge R340 (Intel Xeon E-2288G, 3.70 GHz)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>11.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Jan-2020</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2018</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2019</td>
</tr>
</tbody>
</table>

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-01-28 13:18:36-0500.  
Originally published on 2020-02-29.