# SPEC CPU®2017 Floating Point Rate Result

## Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

| Copies | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 |
|--------|---|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 503.bwaves_r | 88 |   |     |     |     | 188 |   |     |     |     |     | 188 |   |     |     |     |     |     |     |     |     |     |
| 507.cactuBSSN_r | 88 |   |     |     |     | 188 |   |     |     |     |     | 188 |   |     |     |     |     |     |     |     |     |     |
| 508.namd_r | 88 |   |     |     |     | 180 |   |     |     |     |     | 183 |   |     |     |     |     |     |     |     |     |     |
| 510.parest_r | 88 |   |     |     |     | 123 |   |     |     |     |     | 123 |   |     |     |     |     |     |     |     |     |     |
| 511.povray_r | 88 |   |     |     |     | 271 |   |     |     |     |     | 271 |   |     |     |     |     |     |     |     |     |     |
| 519.lbm_r | 88 |   |     |     |     | 125 |   |     |     |     |     | 125 |   |     |     |     |     |     |     |     |     |     |
| 521.wrf_r | 88 |   |     |     |     | 226 |   |     |     |     |     | 226 |   |     |     |     |     |     |     |     |     |     |
| 526.blender_r | 88 |   |     |     |     | 247 |   |     |     |     |     | 247 |   |     |     |     |     |     |     |     |     |     |
| 527.cam4_r | 88 |   |     |     |     | 247 |   |     |     |     |     | 247 |   |     |     |     |     |     |     |     |     |     |
| 538.imagick_r | 88 |   |     |     |     | 550 |   |     |     |     |     | 550 |   |     |     |     |     |     |     |     |     |     |
| 544.nab_r | 88 |   |     |     |     | 304 |   |     |     |     |     | 304 |   |     |     |     |     |     |     |     |     |     |
| 549.fotonik3d_r | 88 |   |     |     |     | 167 |   |     |     |     |     | 167 |   |     |     |     |     |     |     |     |     |     |
| 554.roms_r | 88 |   |     |     |     | 101 |   |     |     |     |     | 101 |   |     |     |     |     |     |     |     |     |     |

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**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Tested by:** Cisco Systems  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2019  
**Test Date:** Oct-2019

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### Hardware

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</tr>
<tr>
<td>Nominal</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled</td>
<td>44 cores, 2 chips, 2 threads/core</td>
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<tr>
<td>Orderable</td>
<td>1,2 Chips</td>
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<tr>
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<td>Cache L2</td>
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<td>Cache L3</td>
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<td>Memory</td>
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<tr>
<td>Storage</td>
<td>1 x 1.9 TB SSD SAS</td>
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### Software

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## Results Table

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</table>

**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/intel64"`

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`

`runcpu` command invoked through `numactl` i.e.:

`numactl --interleave=all runcpu <etc>`

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Oct-2019
CPU2017 License: 9019
Tested by: Cisco Systems
Hardware Availability: Apr-2019
Software Availability: May-2019

SPECrate®2017_fp_base = 226
SPECrate®2017_fp_peak = 230

General Notes (Continued)

is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (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.

Platform Notes

BIOS Settings:
Intel HyperThreading Technology set to Enabled
SNC set to Enabled
IMC Interleaving set to 1-way Interleave
Patrol Scrub set to Disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-jm4k Fri Oct 4 20:36:20 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 6238L CPU @ 2.10GHz
  2 "physical id"s (chips)
  88 "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 : 22
  siblings : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
From lscpu:
  Architecture:     x86_64
  CPU op-mode(s):   32-bit, 64-bit
  Byte Order:       Little Endian
  CPU(s):           88
  On-line CPU(s) list: 0-87
  Thread(s) per core: 2
  Core(s) per socket: 22
  Socket(s):        2
  NUMA node(s):     4
  Vendor ID:        GenuineIntel
  CPU family:       6
  Model:            85
  Model name:       Intel(R) Xeon(R) Gold 6238L CPU @ 2.10GHz

(Continued on next page)
Platform Notes (Continued)

Stepping: 7
CPU MHz: 2100.000
CPU max MHz: 3700.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 30976K
NUMA node0 CPU(s): 0-2, 6-13, 17, 18, 44-46, 50-52, 55-57, 61, 62
NUMA node1 CPU(s): 3-5, 9, 10-16, 19-21, 47-49, 53, 54, 58-60, 63-65
NUMA node2 CPU(s): 22-24, 28-30, 33-35, 39, 40, 66-68, 72-74, 77-79, 83, 84
NUMA node3 CPU(s): 25-27, 31, 32, 36-38, 41-43, 69-71, 75, 76, 80-82, 85-87
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb rdtscp lm constant_tsc art arch_perfmon pews bts rep_good nopl xtopology nonstop_tsc cpuid aperfmpcr tsc_known_freq pni pclmulqdq dtses4 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xpr pdcmd pcd 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_pipin mba tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 emms invpcid rtm cmpflt mpx rdtp aavx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni arch_capabilities ssbd

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 1 2 6 7 8 11 12 13 17 18 44 45 46 50 51 52 55 56 57 61 62
node 0 size: 192077 MB
node 0 free: 179404 MB
node 1 cpus: 3 4 5 9 10 14 15 16 19 20 21 47 48 49 53 54 58 59 60 63 64 65
node 1 size: 193530 MB
node 1 free: 184305 MB
node 2 cpus: 22 23 24 28 29 30 33 34 35 39 40 66 67 68 72 73 74 77 78 79 83 84
node 2 size: 193530 MB
node 2 free: 184316 MB
node 3 cpus: 25 26 27 31 32 36 37 38 41 42 43 69 70 71 75 76 80 81 82 85 86 87
node 3 size: 193529 MB
node 3 free: 184171 MB
node distances:
  node 0 1 2 3
Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

SPECRate®2017_fp_base = 226
SPECRate®2017_fp_peak = 230

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test by: Cisco Systems

Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

Platform Notes (Continued)

0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 791211716 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15"
VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
Linux linux-jm4k 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
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: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Oct 4 11:32

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb1 xfs 224G 56G 168G 26% /

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 Cisco Systems, Inc. C220M5.4.0.4g.0.0712190011 07/12/2019
Memory:
24x 0xCE00 M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2934

(End of data from sysinfo program)
Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)
SPECRate®2017_fp_base = 226
SPECRate®2017_fp_peak = 230

CPU2017 License: 9019
Test Sponsor: Cisco Systems
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Compiler Version Notes

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<table>
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<th>519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)</th>
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<tr>
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<tr>
<td>Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
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Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

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**SPECrate®2017_fp_base = 226**
**SPECrate®2017_fp_peak = 230**

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**Compiler Version Notes (Continued)**

64, Version 19.0.4.227 Build 20190416
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Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
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**Base Compiler Invocation**

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

---

**Base Portability Flags**

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64

(Continued on next page)
Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

| SPECrate\textsuperscript{®}2017\_fp\_base = 226 |
| SPECrate\textsuperscript{®}2017\_fp\_peak = 230 |

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

Base Portability Flags (Continued)

521.wrf\_r:\ -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big_endian
526.blender\_r:\ -DSPEC\_LP64 -DSPEC\_LINUX -funsigned-char
527.cam4\_r:\ -DSPEC\_LP64 -DSPEC\_CASE\_FLAG
538.imagick\_r:\ -DSPEC\_LP64
544.nab\_r:\ -DSPEC\_LP64
549.fotonik3d\_r:\ -DSPEC\_LP64
554.roms\_r:\ -DSPEC\_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

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Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

| SPECrate\(^{2017}\) fp\(_{\text{peak}}\) | 230 |
| SPECrate\(^{2017}\) fp\(_{\text{base}}\) | 226 |

| CPU2017 License: | 9019 |
| Test Sponsor: | Cisco Systems |
| Tested by: | Cisco Systems |
| Test Date: | Oct-2019 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | May-2019 |

**Peak Compiler Invocation (Continued)**

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<tr>
<td>C++ benchmarks:</td>
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<tr>
<td>icpc -m64</td>
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<tr>
<td>ifort -m64 icc -m64 -std=c11</td>
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<td>Benchmarks using both C and C++:</td>
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<tr>
<td>icpc -m64 icc -m64 -std=c11</td>
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<tr>
<td>Benchmarks using Fortran, C, and C++:</td>
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<tr>
<td>icpc -m64 icc -m64 -std=c11 ifort -m64</td>
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**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

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<tr>
<td>C benchmarks:</td>
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<tr>
<td>519.lbm(_r): -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4</td>
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<tr>
<td>538.imagick(_r): -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4</td>
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<tr>
<td>544.nab(_r): Same as 538.imagick(_r)</td>
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<td>C++ benchmarks:</td>
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<tr>
<td>508.namd(_r): -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4</td>
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<tr>
<td>510.parest(_r): -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4</td>
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</tbody>
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Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6238L, 2.10GHz)

SPECrate®2017_fp_base = 226
SPECrate®2017_fp_peak = 230

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Oct-2019
Tested by: Cisco Systems
Hardware Availability: Apr-2019
Software Availability: May-2019

Peak Optimization Flags (Continued)

Fortran benchmarks:
503.bwaves_r -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
511.povray_r -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

526.blender_r -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

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/Cisco-Platform-Settings-V1.2-revJ.xml
## SPEC CPU®2017 Floating Point Rate Result

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**CPU2017 License:** 9019  
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.0.5 on 2019-10-04 11:06:20-0400.  
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