### Dell Inc.

**PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
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<td>Dell Inc.</td>
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<td>CPU2017 License</td>
<td>55</td>
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<tr>
<td>Test Date</td>
<td>May-2021</td>
<td>May-2021</td>
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<tr>
<td>Hardware Availability</td>
<td>Apr-2021</td>
<td>Apr-2021</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Dec-2020</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

| Threads | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 |
|----------|----|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 40 | 562 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 607.cactuBSSN_s | 40 |  | 193 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 619.ibm_s | 40 | 113 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 621.wrf_s | 40 | 136 | 45 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 627.cam4_s | 40 | 108 | 145 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 628.pop2_s | 40 | 77.7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 638.imagick_s | 40 | 131 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 644.nab_s | 40 | 263 | 297 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 649.fotonik3d_s | 40 | 99.5 | 99.9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 654.roms_s | 40 | 160 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

#### Hardware

- **CPU Name:** Intel Xeon Silver 4316
- **Max MHz:** 3400
- **Nominal:** 2300
- **Enabled:** 40 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 30 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
- **Storage:** 125 GB on tmpfs
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux 8.2 (Ootpa)
  - 4.18.0-193.el8.x86_64
- **Compiler:**
  - C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Compiler Build 20201113 for Linux;
  - Fortran: Version 2021.1 of Intel Fortran Compiler
  - Classic Build 20201112 for Linux;
- **Parallel:** Yes
- **Firmware:** Version 1.1.3 released Apr-2021
- **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 and OS set to prefer performance at the cost of additional power usage.
Dell Inc.
PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 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>
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<tr>
<td>603.bwaves_s</td>
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<td>569</td>
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<td>161</td>
<td>98.2</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 154
SPECspeed®2017_fp_peak = 157

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=fine,compact"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/je5.0.1-64"
MALLOC_CONF = "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) 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

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

Dell Inc.
PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 GHz)

SPECspeed®2017_fp_base = 154
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

General Notes (Continued)

Filesystem page cache synced and cleared with:
sync; echo 3>       /proc/sys/vm/drop_caches
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
Logical Processor : Disabled
Virtualization Technology : Disabled

System Profile : Custom
CPU Power Management : Maximum Performance
C1E : Disabled
C States : Autonomous
Memory Patrol Scrub : Disabled
Energy Efficiency Policy : Performance
CPU Interconnect Bus Link
Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.7-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Tue May 18 22:23:02 2021

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) Silver 4316 CPU @ 2.30GHz
  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 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit

(Continued on next page)
Platform Notes (Continued)

Byte Order:          Little Endian
CPU(s):              40
On-line CPU(s) list: 0-39
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
Stepping:            6
CPU MHz:             3228.106
BogoMIPS:            4600.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            30720K
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 nodel CPU(s):   1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop-tsc cpuid
                     aperfperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
                     tpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
                     f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebpx cat_l3 invpcid_single ssbd
                     mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsbgbase
                     tsck_adj bmi1 hle avx2 smep bmi2 erm sinvpcid rtm cqm rdt_a avx512f avx512dq
                     rsseed adx smap avx512sfma clflushopt clwb intel_pt avx512cd sha_2 avx512bw
                     avx512vl xsaveopt xsaves xsavec xgetbv1 xsave qcm_1q cqm_occup_1q cqm_mbmגולשים
                     cqm_mbml_local wboinvd dtherm ida arat pln pts avx512vbi umip pku ospke
                     avx512_vbmi1 gfi vaes vpcmmlqdq avx512_vnni avx512_bitalg tme avx512_vpdcntdq
                     la57 rdpid md_clear pconf config 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: 257409 MB
node 0 free: 247592 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: 258040 MB
node 1 free: 251356 MB

(Continued on next page)
Dell Inc.

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CPU2017 License: 55
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Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

Platform Notes (Continued)

node distances:
node  0  1
 0:  10  20
 1:  20  10

From /proc/meminfo
MemTotal: 527821520 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.2 (Ootpa)"
ID="rheil"
ID_LIKE="fedora"
VERSION_ID="8.2"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2018-12207 (iTLB Multihit): Not affected
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/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

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

Dell Inc.  
PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 GHz)  

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CPU2017 License: 55  
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Platform Notes (Continued)

run-level 3 May 18 19:34

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1

Filesystem   Type   Size  Used  Avail Use% Mounted on
tmpfs        tmpfs  125G   11G  115G   9% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge MX750c
Product Family: PowerEdge
Serial: 1234567

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:
1x 002C00B3002C 18ASF4G72FD2-3G2E1 32 GB 2 rank 3200, configured at 2666
15x 00AD063200AD HMAA4GR7AJR8R-XN 32 GB 2 rank 3200, configured at 2666
16x Not Specified Not Specified

BIOS:
  BIOS Vendor: Dell Inc.
  BIOS Version: 1.1.3
  BIOS Date: 04/27/2021
  BIOS Revision: 1.1

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C     | Intel(R) 64 Compiler Classic for applications running on Intel(R)  
               | 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
C               | 644.nab_s(peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
               | Version 2021.1 Build 20201113
(Continued on next page)
### Dell Inc.

PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 GHz)

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#### Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |

| C | 644.nab_s(peak) |
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |

| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
| Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |

| C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |

| Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
**Copyright (C) 1985-2020 Intel Corporation. All rights reserved.** |

| Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak) |

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Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves.s: -DSPEC_LP64
607.cactuBSSN.s: -DSPEC_LP64
619.lbm.s: -DSPEC_LP64
621.wrf.s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4.s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2.s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
                 -assume byterecl
638.imagick.s: -DSPEC_LP64
644.nab.s: -DSPEC_LP64
649.fotonik3d.s: -DSPEC_LP64
654.roms.s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
Dell Inc.
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Base Optimization Flags (Continued)

C benchmarks (continued):
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc

644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags
SPEC CPU®2017 Floating Point Speed Result

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CPU2017 License: 55  Test Date: May-2021
Test Sponsor: Dell Inc.  Hardware Availability: Apr-2021
Tested by: Dell Inc.  Software Availability: Dec-2020

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes


Fortran benchmarks:
603.bwaves_s: basepeak = yes

649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:
621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -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 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: basepeak = yes
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge MX750c (Intel Xeon Silver 4316, 2.30 GHz)

<table>
<thead>
<tr>
<th>Specspeed®2017_fp_base</th>
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<tbody>
<tr>
<td>Specspeed®2017_fp_peak</td>
<td>157</td>
</tr>
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</table>

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

Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

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-ic2021-official-linux64_revA.xml

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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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