## SPEC CPU® 2017 Integer Rate Result

**Dell Inc.**

PowerEdge R750xs (Intel Xeon Gold 6330N, 2.20 GHz)

**SPECrater®2017_int_base = 339**

**SPECrater®2017_int_peak = 351**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Oct-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>May-2021</td>
</tr>
</tbody>
</table>

### Hardware

| Copy | 0 | 30.0 | 70.0 | 110.0 | 150.0 | 190.0 | 230.0 | 270.0 | 310.0 | 350.0 | 390.0 | 430.0 | 470.0 | 510.0 | 550.0 | 590.0 | 630.0 | 670.0 | 710.0 | 750.0 |
|------|----|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 500.perlbench_r | 112 | 235 |
| 502.gcc_r | 112 | 244 | 270 |
| 505.mcf_r | 112 | 317 |
| 520.omnetpp_r | 112 | 546 |
| 523.xalancbmk_r | 112 |
| 525.x264_r | 112 |
| 531.deepsjeng_r | 112 | 699 |
| 541.leela_r | 112 |
| 548.exchange2_r | 112 | 722 |
| 557.xz_r | 112 |

### Software

- **OS:** Red Hat Enterprise Linux 8.4 (Ootpa)
  4.18.0-305.el8.x86_64
- **Compiler:**
  - C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Fortran: Version 2021.1 of Intel Fortran Compiler
  - Classic Build 20201112 for Linux;
- **Firmware:** Version 1.2.1 released May-2021
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

### CPU Specifications

- **CPU Name:** Intel Xeon Gold 6330N
- **Max MHz:** 3400
- **Nominal:** 2200
- **Enabled:** 56 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
  - L2: 1.25 MB I+D on chip per core
  - L3: 42 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
- **Storage:** 225 GB on tmpfs
- **Other:** None

---

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PowerEdge R750xs (Intel Xeon Gold 6330N, 2.20 GHz)

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Results Table

<table>
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<tr>
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<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>500</td>
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<tr>
<td>523.xalanbmk_r</td>
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<td>288</td>
<td>411</td>
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<td>112</td>
<td>268</td>
<td>732</td>
<td>267</td>
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<tr>
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<td>484</td>
<td>265</td>
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<td>557.xz_r</td>
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<td>193</td>
<td>112</td>
<td>626</td>
<td>193</td>
<td>627</td>
</tr>
</tbody>
</table>

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

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH = 
"/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/ia32:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-32"

MALLOCONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
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

(Continued on next page)
Dell Inc. PowerEdge R750xs (Intel Xeon Gold 6330N, 2.20 GHz)

SPEC CPU®2017 Integer Rate Result

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Dell Inc. SPECrate®2017_int_base = 339

SPECrate®2017_int_peak = 351

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Oct-2021
Hardware Availability: Jul-2021
Software Availability: May-2021

General Notes (Continued)

runcpu command invoked through numacl i.e.:
numactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:
Sub NUMA Cluster : 2-Way Clustering
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
PCI ASPM L1 Link
Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on r750xs.jzjpm83.inside.dell.com Thu Oct 14 12:07:59 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) Gold 6330N CPU @ 2.20GHz
  2 "physical id"s (chips)
  112 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following

(Continued on next page)
Dell Inc.

PowerEdge R750xs (Intel Xeon Gold 6330N, 2.20 GHz)

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**Platform Notes (Continued)**

excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

- cpu cores : 28
- siblings : 56
- physical 0: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
- physical 1: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

From lscpu from util-linux 2.32.1:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 112
- On-line CPU(s) list: 0-111
- Core(s) per core: 2
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- BIOS Vendor ID: Intel
- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
- BIOS Model name: Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
- Stepping: 6
- CPU MHz: 3210.486
- BogoMIPS: 4400.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 43008K
- NUMA node0 CPU(s):
- NUMA node1 CPU(s):
- NUMA node2 CPU(s):
- NUMA node3 CPU(s):
- 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 pdpetlb rdtscp
  - lm constant_tsc 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
  - xtrnr pdcm pcid 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 invp-ci single
  - intel_patin ssbd mba ibrs ibpbi stibp ibrs_enhanced fsbgsbase tsc_adjust bmi1 hle avx2
  - smep bmi2 ertms invpcid cgm rdt_a avx512f avx512dq rdsbd adx smap avx512ifma
  - clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgtbvl

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Platform Notes (Continued)

xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd
dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrm md_clear pconfig
flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size: 43008 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 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96
        100 104 108
node 0 size: 128155 MB
node 0 free: 107724 MB
node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
        102 106 110
node 1 size: 129017 MB
node 1 free: 113029 MB
node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97
        101 105 109
node 2 size: 128980 MB
node 2 free: 104671 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99
        103 107 111
node 3 size: 129015 MB
node 3 free: 113713 MB
node distances:
node 0: 10 11 20 20
0: 10 11 20 20
1: 11 10 20 20
2: 20 20 10 11
3: 20 20 11 10

From /proc/meminfo
MemTotal: 527533404 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="8.4 (Ootpa)"
ID="rhel"

(Continued on next page)
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Platform Notes (Continued)

ID_LIKE="fedora"
VERSION_ID="8.4"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
Linux r750xs.jzjpm83.inside.dell.com 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30
EDT 2021 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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1):
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Oct 11 15:35

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 225G 67G 159G 30% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R750xs
Product Family: PowerEdge
Serial: JZJPM83

Additional information from dmidecode 3.2 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:
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Platform Notes (Continued)

16x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666

BIOS:
  BIOS Vendor: Dell Inc.
  BIOS Version: 1.2.1
  BIOS Date: 05/28/2021
  BIOS Revision: 1.2

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 500.perlbench_r(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       | 502.gcc_r(peak) |
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak) |
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**Compiler Version Notes (Continued)**

```
C       | 502.gcc_r(peak)
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---

C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, 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       | 502.gcc_r(peak)
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C       | 502.gcc_r(peak)
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---

C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, peak)
---
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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---

C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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### Compiler Version Notes (Continued)

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------------------------------------------------------------------------------

Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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------------------------------------------------------------------------------

### Base Compiler Invocation

**C benchmarks:**  
- icx

**C++ benchmarks:**  
- icpx

**Fortran benchmarks:**  
- ifort

### Base Portability Flags

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
- 502.gcc_r: -DSPEC_LP64  
- 505.mcf_r: -DSPEC_LP64  
- 520.omnetpp_r: -DSPEC_LP64  
- 523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
- 525.x264_r: -DSPEC_LP64  
- 531.deepsjeng_r: -DSPEC_LP64  
- 541.leela_r: -DSPEC_LP64  
- 548.exchange2_r: -DSPEC_LP64  
- 557.xz_r: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**  
- -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
- -mbranches-within-32B-boundaries

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Base Optimization Flags (Continued)

C benchmarks (continued):
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -1qkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -1qkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -1qkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
  icx
  500.perlbench_r: icc

C++ benchmarks:
  icpx

Fortran benchmarks:
  ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64

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SPECrate®2017_int_base = 339

SPECrate®2017_int_peak = 351

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Oct-2021
Tested by: Dell Inc.
Hardware Availability: Jul-2021
Software Availability: May-2021

Peak Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -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/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89
-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
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

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

**Dell Inc.**

PowerEdge R750xs (Intel Xeon Gold 6330N, 2.20 GHz)

<table>
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<tr>
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**SPECrate®2017 int_base = 339**

**SPECrate®2017 int_peak = 351**

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**Peak Optimization Flags (Continued)**

548.exchange2_r: 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:


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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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