# Lenovo Global Technology

## SPEC CPU®2017 Integer Speed Result

**ThinkSystem SR655**  
3.00 GHz, AMD EPYC 7313P

**CPU2017 License**: 9017  
**Test Sponsor**: Lenovo Global Technology  
**Tested by**: Lenovo Global Technology  
**Test Date**: Jul-2021  
**Hardware Availability**: Jun-2021  
**Software Availability**: Mar-2021

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>7.26</td>
<td>13.7</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>1</td>
<td>13.8</td>
<td>21.1</td>
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<tr>
<td>605.mcf_s</td>
<td>1</td>
<td>8.71</td>
<td>21.1</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>1</td>
<td>8.84</td>
<td>21.1</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>16</td>
<td>14.2</td>
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<tr>
<td>625.x264_s</td>
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<td>17.3</td>
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<tr>
<td>631.deepsjeng_s</td>
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<td></td>
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<tr>
<td>641.leela_s</td>
<td>1</td>
<td>5.87</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td></td>
<td>23.7</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
<td></td>
<td>23.8</td>
</tr>
</tbody>
</table>

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### Hardware

- **CPU Name**: AMD EPYC 7313P  
- **Max MHz**: 3700  
- **Nominal**: 3000  
- **Enabled**: 16 cores, 1 chip, 2 threads/core  
- **Orderable**: 1 chip  
- **Cache L1**: 32 KB I + 32 KB D on chip per core  
- **L2**: 512 KB I+D on chip per core  
- **L3**: 128 MB I+D on chip per chip, 32 MB shared / 4 cores  
- **Memory**: 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)  
- **Storage**: 1 x 960 GB SATA SSD  
- **Other**: None  

### Software

- **OS**: SUSE Linux Enterprise Server 15 SP2 (x86_64)  
  Kernel 5.3.18-22-default  
- **Compiler**: C/C++/Fortran: Version 3.0.0 of AOCC  
- **Parallel**: Yes  
- **Firmware**: Lenovo BIOS Version CFE125U 6.0 released May-2021  
- **File System**: xfs  
- **System State**: Run level 3 (multi-user)  
- **Base Pointers**: 64-bit  
- **Peak Pointers**: 64-bit  
- **Other**: jemalloc: jemalloc memory allocator library v5.1.0  
- **Power Management**: BIOS and OS set to prefer performance at the cost of additional power usage
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---

**SPEC®2017_int_base = 12.5**

**SPEC®2017_int_peak = 12.6**

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Threads</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
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<th>Peak Ratio</th>
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<td>21.1</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>8.84</td>
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<td>8.71</td>
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<td>625.x264_s</td>
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<td>102</td>
<td>17.3</td>
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<td>17.2</td>
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<td>102</td>
<td>17.4</td>
<td>101</td>
<td>17.4</td>
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<td>218</td>
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<td>23.8</td>
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<td>23.7</td>
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<tr>
<td>657.xz_s</td>
<td>16</td>
<td>265</td>
<td>23.3</td>
<td>264</td>
<td>23.4</td>
<td>16</td>
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<td>23.3</td>
<td>264</td>
<td>23.4</td>
<td>264</td>
<td>23.4</td>
</tr>
</tbody>
</table>

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### Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

### Submit Notes

The config file option 'submit' was used.

'numactl' was used to bind copies to the cores.

See the configuration file for details.

---

### Operating System Notes

'ulimit -s unlimited' was used to set environment stack size

'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:

numactl --interleave=all runcpu <etc>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.

'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.

'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.

'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.

'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.

To enable Transparent Hugepages (THP) for all allocations,

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and

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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.6

Computational Notes

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General Notes (Continued)

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
NUMA nodes per socket set to NPS2

Sysinfo program /home/cpu2017-1.1.8-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Fri Apr 17 21:58:36 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: AMD EPYC 7313P 16-Core Processor
  1 "physical id"s (chips)
  32 "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: 16
siblings: 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu from util-linux 2.33.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 48 bits physical, 48 bits virtual
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7313P 16-Core Processor

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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stepping: 1</td>
</tr>
<tr>
<td>CPU MHz: 3633.945</td>
</tr>
<tr>
<td>CPU max MHz: 3000.0000</td>
</tr>
<tr>
<td>CPU min MHz: 1500.0000</td>
</tr>
<tr>
<td>BogoMIPS: 5988.62</td>
</tr>
<tr>
<td>Virtualization: AMD-V</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 512K</td>
</tr>
<tr>
<td>L3 cache: 32768K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-7,16-23</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 8-15,24-31</td>
</tr>
<tr>
<td>Flags: ...</td>
</tr>
<tr>
<td>/proc/cpuinfo cache data</td>
</tr>
<tr>
<td>cache size : 512 KB</td>
</tr>
<tr>
<td>From numactl --hardware</td>
</tr>
<tr>
<td>WARNING: a numactl 'node'</td>
</tr>
<tr>
<td>available: 2 nodes (0-1)</td>
</tr>
<tr>
<td>node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23</td>
</tr>
<tr>
<td>node 0 size: 128825 MB</td>
</tr>
<tr>
<td>node 0 free: 128398 MB</td>
</tr>
<tr>
<td>node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31</td>
</tr>
<tr>
<td>node 1 size: 128973 MB</td>
</tr>
<tr>
<td>node 1 free: 128567 MB</td>
</tr>
<tr>
<td>node distances:</td>
</tr>
<tr>
<td>node 0 1</td>
</tr>
<tr>
<td>0: 10 12</td>
</tr>
<tr>
<td>1: 12 10</td>
</tr>
<tr>
<td>From /proc/meminfo</td>
</tr>
<tr>
<td>MemTotal: 263985332 kB</td>
</tr>
<tr>
<td>HugePages_Total: 0</td>
</tr>
<tr>
<td>Hugepagesize: 2048 kB</td>
</tr>
</tbody>
</table>

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SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.6

CPU2017 License: 9017
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<tbody>
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<tr>
<td>ThinkSystem SR655</td>
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<tr>
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<td>SPECspeed®2017_int_base = 12.5</td>
</tr>
<tr>
<td>SPECspeed®2017_int_peak = 12.6</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 15 SP2

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP2"
    VERSION_ID="15.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
  Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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/swapsgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
un-level 3 Apr 17 21:14

SPEC is set to: /home/cpu2017-1.1.8-amd-aocc300-milan-B1

<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/sdb3</td>
<td>xfs</td>
<td>891G</td>
<td>78G</td>
<td>813G</td>
<td>9%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
  Vendor: Lenovo

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Platform Notes (Continued)

Product: ThinkSystem SR655 -[7Y00000000]-
Product Family: ThinkSystem
Serial: 0123456789

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:
8x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200
8x Unknown Unknown

BIOS:
BIOS Vendor: Lenovo
BIOS Version: CFE125U
BIOS Date: 05/28/2021
BIOS Revision: 6.0

(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)

-----------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

-----------------------------
C++
| 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)

-----------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

-----------------------------
Fortran
| 648.exchange2_s(base, peak)

(Continued on next page)
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### Compiler Version Notes (Continued)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

### Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

### Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
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:
-m64 -mno-adx -mno-sse4a -W1,-allow-multiple-definition
-W1,-mlllvm -W1,-enable-licm-vrp -W1,-mlllvm -W1,-region-vectorize
-W1,-mlllvm -W1,-function-specialize
-W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5

(Continued on next page)
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Base Optimization Flags (Continued)

C benchmarks (continued):
-mlirm -unroll-threshold=50 -mlirm -inline-threshold=1000
-fremap-arrays -mlirm -function-specialize -flv-function-specialization
-mlirm -enable-gvn-hoist -mlirm -global-vectorize-slp=true
-mlirm -enable-licm-vrp -mlirm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llang -llangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mlirm -Wl,-do-block-reorder=aggressive
-Wl,-mlirm -Wl,-region-vectorize -Wl,-mlirm -Wl,-function-specialize
-Wl,-mlirm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mlirm -enable-partial-unswitch
-mlirm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mlirm -loop-unswitch-threshold=200000
-mlirm -rerral-loops -mlirm -aggressive-loop-unswitch
-mlirm -extra-vectorizer-passes -mlirm -reduce-array-computations=3
-mlirm -global-vectorize-slp=true -mlirm -convert-pow-exp-to-int=false
-z muldefs -mlirm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llang
-llangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mlirm -Wl,-inline-recursion=4
-Wl,-mlirm -Wl,-lsr-in-nested-loop -Wl,-mlirm -Wl,-enable-iv-split
-Wl,-mlirm -Wl,-region-vectorize -Wl,-mlirm -Wl,-function-specialize
-Wl,-mlirm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -z muldefs
-mlirm -unroll-aggressive -mlirm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llang
-llangrti

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

C++ benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR655**  
3.00 GHz, AMD EPYC 7313P

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<th>SPECspeed®2017_int_base</th>
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### CPU2017 License: 9017

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## SPEC CPU®2017 Integer Speed Result

### Base Other Flags (Continued)

- Fortran benchmarks:
  - `-Wno-return-type`

### Peak Compiler Invocation

- C benchmarks:
  - `clang`
- C++ benchmarks:
  - `clang++`

- Fortran benchmarks:
  - `flang`

### Peak Portability Flags

- Same as Base Portability Flags

### Peak Optimization Flags

- C benchmarks:
  - `600.perlbench_s:basepeak = yes`
  - `605.mcf_s: Same as 602.gcc_s`

(Continued on next page)
### Lenovo Global Technology

#### SPEC CPU®2017 Integer Speed Result

**ThinkSystem SR655**  
3.00 GHz, AMD EPYC 7313P

**SPECspeed®2017_int_base = 12.5**  
**SPECspeed®2017_int_peak = 12.6**

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**Peak Optimization Flags (Continued)**

- `625.x264_s`: Same as `602.gcc_s`

- `657.xz_s`: basepeak = yes

**C++ benchmarks:**


- `623.xalancbmk_s`: basepeak = yes

- `631.deepsjeng_s`: Same as `620.omnetpp_s`

- `641.leela_s`: Same as `620.omnetpp_s`

**Fortran benchmarks:**


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**Peak Other Flags**

- `-Wno-unused-command-line-argument -Wno-return-type`

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(Continued on next page)
**Peak Other Flags (Continued)**

C++ benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
-Wno-return-type

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.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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