



# SPEC<sup>®</sup> CFP2006 Result

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## IBM Corporation

IBM System x3755 M3  
(AMD Opteron 6344, 2.60 GHz)

SPECfp<sup>®</sup>\_rate2006 = 728

SPECfp\_rate\_base2006 = 660

CPU2006 license: 11

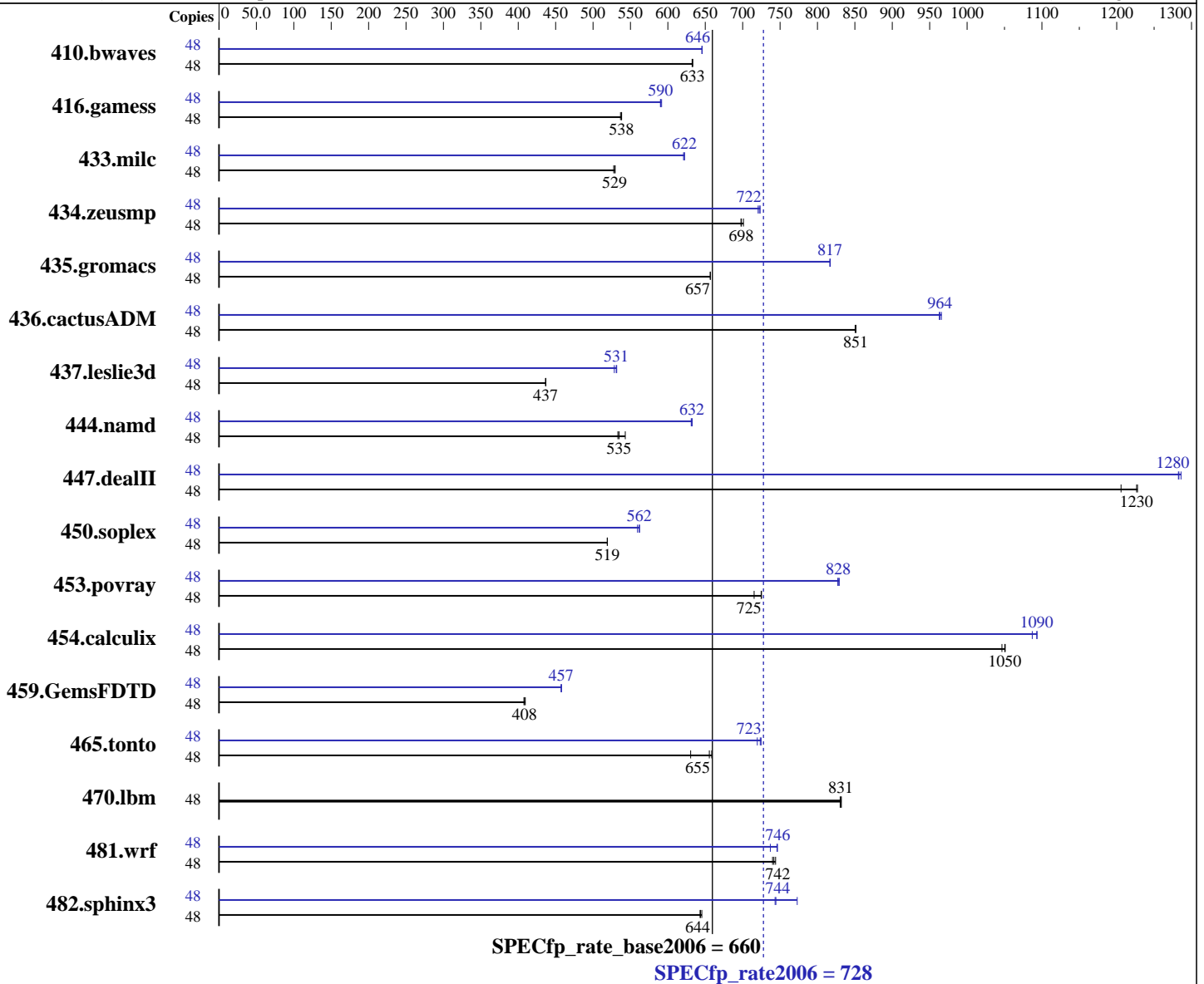
Test sponsor: IBM Corporation

Tested by: IBM Corporation

Test date: Aug-2014

Hardware Availability: Dec-2013

Software Availability: Aug-2012



**Hardware**

CPU Name: AMD Opteron 6344  
 CPU Characteristics: AMD Turbo CORE technology up to 3.20 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 48 cores, 4 chips, 12 cores/chip  
 CPU(s) orderable: 2,4 chips

**Software**

Operating System: Red Hat Enterprise Linux Server release 6.4 (Santiago)  
 2.6.32-358.el6.x86\_64  
 Compiler: C/C++/Fortran: Version 4.5.2 of x86 Open64 Compiler Suite (from AMD)  
 Auto Parallel: No  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit

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Primary Cache: 384 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core

Secondary Cache: 12 MB I+D on chip per chip, 2 MB shared / 2 cores

L3 Cache: 16 MB I+D on chip per chip, 8 MB shared / 6 cores

Other Cache: None

Memory: 512 GB (32 x 16 GB 2Rx4 PC3-14900R-13, ECC,  
running at 1600 MHz)

Disk Subsystem: 1 x 600 GB SAS, 15000 RPM

Other Hardware: None

Peak Pointers: 32/64-bit  
Other Software: None

## Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
410.bwaves	48	1031	632	1030	633	<b><u>1031</u></b>	<b><u>633</u></b>	48	<b><u>1010</u></b>	<b><u>646</u></b>	1010	646	1010	646		
416.gamess	48	1746	538	<b><u>1747</u></b>	<b><u>538</u></b>	1751	537	48	<b><u>1592</u></b>	<b><u>590</u></b>	1593	590	1589	592		
433.milc	48	832	530	835	528	<b><u>833</u></b>	<b><u>529</u></b>	48	<b><u>708</u></b>	<b><u>622</u></b>	708	622	710	621		
434.zeusmp	48	623	701	<b><u>626</u></b>	<b><u>698</u></b>	626	698	48	604	723	<b><u>605</u></b>	<b><u>722</u></b>	606	721		
435.gromacs	48	522	657	<b><u>522</u></b>	<b><u>657</u></b>	522	657	48	420	817	<b><u>420</u></b>	<b><u>817</u></b>	419	817		
436.cactusADM	48	<b><u>674</u></b>	<b><u>851</u></b>	675	850	674	851	48	594	966	596	963	<b><u>595</u></b>	<b><u>964</u></b>		
437.leslie3d	48	1033	437	<b><u>1033</u></b>	<b><u>437</u></b>	1033	437	48	<b><u>850</u></b>	<b><u>531</u></b>	849	532	854	528		
444.namd	48	722	533	<b><u>720</u></b>	<b><u>535</u></b>	709	543	48	610	631	609	632	<b><u>609</u></b>	<b><u>632</u></b>		
447.dealII	48	<b><u>448</u></b>	<b><u>1230</u></b>	455	1210	447	1230	48	427	1290	428	1280	<b><u>428</u></b>	<b><u>1280</u></b>		
450.soplex	48	771	519	771	519	<b><u>771</u></b>	<b><u>519</u></b>	48	<b><u>713</u></b>	<b><u>562</u></b>	716	559	712	562		
453.povray	48	352	725	357	715	<b><u>352</u></b>	<b><u>725</u></b>	48	309	827	<b><u>308</u></b>	<b><u>828</u></b>	308	829		
454.calculix	48	378	1050	377	1050	<b><u>377</u></b>	<b><u>1050</u></b>	48	<b><u>362</u></b>	<b><u>1090</u></b>	364	1090	362	1090		
459.GemsFDTD	48	<b><u>1247</u></b>	<b><u>408</u></b>	1244	409	1249	408	48	1113	457	1112	458	<b><u>1113</u></b>	<b><u>457</u></b>		
465.tonto	48	717	659	<b><u>721</u></b>	<b><u>655</u></b>	749	630	48	656	720	652	725	<b><u>653</u></b>	<b><u>723</u></b>		
470.lbm	48	<b><u>793</u></b>	<b><u>831</u></b>	793	832	794	830	48	<b><u>793</u></b>	<b><u>831</u></b>	793	832	794	830		
481.wrf	48	721	744	<b><u>723</u></b>	<b><u>742</u></b>	725	740	48	<b><u>719</u></b>	<b><u>746</u></b>	718	747	728	737		
482.sphinx3	48	1450	645	<b><u>1454</u></b>	<b><u>644</u></b>	1455	643	48	1210	773	1259	743	<b><u>1257</u></b>	<b><u>744</u></b>		

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

## 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

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## Operating System Notes (Continued)

Set transparent\_hugepage=never as a boot parameter in /boot/grub/menu.lst

Set vm/nr\_hugepages=43008 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages

## Platform Notes

BIOS setting:

Operating Mode set to Performance

Sysinfo program /home/SPECcpu-20120821-amd1206/Docs/sysinfo-rev6818

\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ 5569a0425e2ad530534e4c79a46e4d28

running on x3755M3 Thu Aug 14 19:08:09 2014

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:

<http://www.spec.org/cpu2006/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : AMD Opteron(tm) Processor 6344

4 "physical id"s (chips)

48 "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 : 6

siblings : 12

physical 0: cores 0 1 2 3 4 5

physical 1: cores 0 1 2 3 4 5

physical 2: cores 0 1 2 3 4 5

physical 3: cores 0 1 2 3 4 5

cache size : 2048 KB

From /proc/meminfo

MemTotal: 529379188 kB

HugePages\_Total: 43008

Hugepagesize: 2048 kB

/usr/bin/lsc\_release -d

Red Hat Enterprise Linux Server release 6.4 (Santiago)

From /etc/\*release\* /etc/\*version\*

redhat-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)

system-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)

system-release-cpe: cpe:/o:redhat:enterprise\_linux:6server:ga:server

uname -a:

Linux x3755M3 2.6.32-358.el6.x86\_64 #1 SMP Tue Jan 29 11:47:41 EST 2013

x86\_64 x86\_64 x86\_64 GNU/Linux

run-level 3 Aug 12 16:16

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## Platform Notes (Continued)

SPEC is set to: /home/SPECcpu-20120821-amd1206  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/mapper/VolGroup-lv\_root  
ext4 546G 151G 368G 30% /

Additional information from dmidecode:  
BIOS American Megatrends Inc. -[AYE167AUS-1.14]- 10/14/2013  
Memory:  
32x 16 GB  
32x Samsung M393B2G70BH0- 16 GB 1866 MHz 2 rank

(End of data from sysinfo program)  
The sysinfo-rev6818 used in this submission has an issue parsing the dmidecode output with "Memory Device Mapped Address" lines. The additional "32x 16 GB" in the sysinfo section above are not actual memory DIMMs and can be ignored.

## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/home/SPECcpu-20120821-amd1206/amd1206-rate-libs-revA/32:/home/SPECcpu-20120821-amd1206/amd1206-rate-libs-revA/64"

The x86 Open64 Compiler Suite is only available from (and supported by) AMD at <http://developer.amd.com/cpu/open64>

Binaries were compiled on a system with 2x AMD Opteron 6386SE chips + 128GB Memory using RHEL 6.3

## Base Compiler Invocation

C benchmarks:  
opencc

C++ benchmarks:  
openCC

Fortran benchmarks:  
openf95

Benchmarks using both Fortran and C:  
opencc openf95

## Base Portability Flags

410.bwaves: -DSPEC\_CPU\_LP64  
416.gamess: -DSPEC\_CPU\_LP64  
433.milc: -DSPEC\_CPU\_LP64  
434.zeusmp: -DSPEC\_CPU\_LP64

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## Base Portability Flags (Continued)

```

435.gromacs: -DSPEC_CPU_LP64
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
      -fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

```

## Base Optimization Flags

C benchmarks:

```

-Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000
-IPA:small_pu=100 -mso -march=bdver1

```

C++ benchmarks:

```

-Ofast -static -CG:load_exe=0 -OPT:malloc_alg=1 -INLINE:aggressive=on
-HP:bd=2m:heap=2m -D__OPEN64_FAST_SET -march=bdver1

```

Fortran benchmarks:

```

-Ofast -LNO:blocking=off -LNO:simd_peel_align=on -OPT:rsqrt=2
-OPT:unroll_size=256 -HP:bd=2m:heap=2m -mso -march=bdver1

```

Benchmarks using both Fortran and C:

```

-Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000
-IPA:small_pu=100 -mso -march=bdver1 -LNO:blocking=off
-LNO:simd_peel_align=on -OPT:rsqrt=2 -OPT:unroll_size=256

```

## Peak Compiler Invocation

C benchmarks:

opencc

C++ benchmarks:

openCC

Fortran benchmarks:

openf95

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## Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:  
opencc openf95

## Peak Portability Flags

```

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
-fno-second-underscore

```

## Peak Optimization Flags

C benchmarks:

```

433.milc: -Ofast -CG:movnti=1 -CG:locs_best=on -HP:bdt=2m:heap=2m
-IPA:plimit=7000 -IPA:callee_limit=1200
-OPT:struct_array_copy=2 -OPT:alias=field_sensitive -mso
-march=bdver1

470.lbm: basepeak = yes

482.sphinx3: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-m32 -IPA:plimit=1000 -OPT:malloc_alg=2 -CG:cmp_peep=on
-CG:p2align=0 -CG:load_exe=1 -CG:dsched=on
-INLINE:aggressive=on -LNO:prefetch=2 -LNO:prefetch_ahead=4
-mso -march=bdver2

```

C++ benchmarks:

```

444.namd: -Ofast -IPA:plimit=3000 -LNO:ignore_feedback=off
-CG:local_sched_alg=0 -CG:load_exe=0 -OPT:unroll_size=256
-fno-exceptions -HP:bdt=2m:heap=2m -LNO:if_select_conv=1
-OPT:alias=disjoint -LNO:psimd_iso_unroll=ON -march=bdver1

```

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## Peak Optimization Flags (Continued)

447.dealll: -Ofast -D\_OPEN64\_FAST\_SET -static -INLINE:aggressive=on  
-LNO:opt=1 -LNO:simd=2 -fno-emit-exceptions -m32  
-OPT:unroll\_times\_max=8 -OPT:unroll\_size=256  
-OPT:unroll\_level=2 -HP:bdt=2m:heap=2m -GRA:unspill=on  
-CG:cmp\_peep=on -CG:movext\_icmp=off -TENV:frame\_pointer=off  
-march=bdver1

450.soplex: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -O3  
-LNO:ignore\_feedback=off -INLINE:aggressive=on -OPT:RO=1  
-OPT:IEEE\_arith=3 -OPT:IEEE\_NaN\_Inf=off  
-OPT:fold\_unsigned\_relops=on -fno-exceptions -CG:p2align=0  
-m32 -mno-fma4 -HP:bdt=2m:heap=2m -WOPT:sib=on  
-march=bdver1

453.povray: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-CG:pre\_local\_sched=off -CG:p2align=0 -CG:p2align\_split=on  
-CG:dsched=on -INLINE:aggressive=on -HP:bd=2m:heap=2m  
-OPT:transform=2 -OPT:alias=disjoint -WOPT:aggcm=0  
-march=bdver2

Fortran benchmarks:

410.bwaves: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-OPT:Ofast -OPT:treeheight=on -LNO:blocking=off  
-LNO:ignore\_feedback=off -LNO:fu=4 -LNO:loop\_model\_simd=on  
-LNO:simd\_rm\_unity\_remainder=on -WOPT:aggstr=0  
-HP:bdt=2m:heap=2m -CG:cmp\_peep=on -march=bdver1

416.gamess: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-LNO:fu=6 -LNO:blocking=0 -LNO:simd=2 -OPT:ro=3  
-OPT:recip=on -CG:local\_sched\_alg=1 -HP:bdt=2m:heap=2m  
-WOPT:sib=on -march=bdver1

434.zeusmp: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-LNO:blocking=off -LNO:interchange=off -IPA:plimit=1500  
-HP:bdt=2m:heap=2m -march=bdver1

437.leslie3d: -Ofast -CG:pre\_minreg\_level=2 -LNO:simd=0 -LNO:fusion=2  
-HP:bdt=2m:heap=2m -mso -march=bdver1

459.GemsFDTD: -Ofast -IPA:plimit=1500 -OPT:unroll\_size=1024  
-OPT:unroll\_times\_max=16 -LNO:fission=2  
-CG:local\_sched\_alg=2 -HP -march=bdver1

465.tonto: -Ofast -OPT:alias=no\_f90\_pointer\_alias -LNO:blocking=off  
-CG:load\_exe=1 -CG:local\_sched\_alg=3 -IPA:plimit=525  
-HP:bdt=2m:heap=2m -march=bdver1

Benchmarks using both Fortran and C:

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## Peak Optimization Flags (Continued)

435.gromacs: -Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m  
-CG:local\_sched\_alg=2 -CG:load\_exe=3 -GRA:unspill=on  
-march=bdver1 -LNO:simd=3

436.cactusADM: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-LNO:blocking=off -LNO:prefetch=2 -LNO:pf2=0  
-LNO:prefetch\_ahead=4 -HP -CG:locs\_shallow\_depth=1  
-CG:load\_exe=0 -CG:dsched=on -WOPT:sib=on -march=bdver1

454.calculix: -Ofast -OPT:unroll\_size=256 -OPT:alias=disjoint  
-GRA:optimize\_boundary=on -CG:dsched=on -HP:bdt=2m:heap=2m  
-march=bdver1

481.wrf: -Ofast -LNO:blocking=off -LANG:copyinout=off  
-IPA:callee\_limit=5000 -GRA:prioritize\_by\_density=on -HP  
-WOPT:sib=on -march=bdver1

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-III.html>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-AMD-A.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-III.xml>

<http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-AMD-A.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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