

Ruby - Bug #21333

heap-use-after-free caused by rehash during update

05/13/2025 12:19 PM - cyruscyliu (Qiang Liu)

Status:	Closed	
Priority:	Normal	
Assignee:		
Target version:		
ruby -v:	ruby 3.5.0dev (2025-05-13T08:35:34Z master a6435befa7) +PRISM [x86_64-linux]	Backport: 3.2: REQUIRED, 3.3: DONE, 3.4: DONE

Description

Hi, we found a heap-use-after-free caused by rehash during update

```
$a = (1..1337).to_h { |k| [k, k] }
$a.update($b) { |k, o, n|
  $a.rehash
}
```

```
$ git log | head -n4
commit a6435befa76c2ae0525147f934bd9cd1914ffb8a
Author: Jean Boussier <jean.boussier@gmail.com>
Date: Mon May 12 11:02:17 2025 +0200
$ ./ruby triaged/hash_update.rb
`RubyGems' were not loaded.
`error_highlight' was not loaded.
`did_you_mean' was not loaded.
`syntax_suggest' was not loaded.
=====
==227694==ERROR: AddressSanitizer: heap-use-after-free on address 0x52f00000e410 at pc 0x64f4179fa0d5 bp 0x7ffec17cce10 sp 0x7ffec17cce08
WRITE of size 8 at 0x52f00000e410 thread T0
#0 0x64f4179fa0d4 in rb_st_update /media/test/ruby/build/./st.c:1508:23
#1 0x64f417814018 in rb_hash_stlike_update /media/test/ruby/build/./hash.c:1686:12
#2 0x64f417814018 in tbl_update /media/test/ruby/build/./hash.c:1727:15
#3 0x64f417823d09 in rb_hash_update_block_i /media/test/ruby/build/./hash.c:4162:5
#4 0x64f417810576 in hash_ar_foreach_iter /media/test/ruby/build/./hash.c:1302:18
#5 0x64f417810576 in ar_foreach_check /media/test/ruby/build/./hash.c:944:22
#6 0x64f417810576 in hash_foreach_call /media/test/ruby/build/./hash.c:1435:15
#7 0x64f4177a45c6 in rb_ensure /media/test/ruby/build/./eval.c:1074:18
#8 0x64f417810329 in rb_hash_foreach /media/test/ruby/build/./hash.c:1463:9
#9 0x64f41781b88f in rb_hash_update /media/test/ruby/build/./hash.c:4219:13
#10 0x64f417b409db in vm_call_cfunc_with_frame_ /media/test/ruby/build/./vm_insnhelper.c:3798
:11
#11 0x64f417b2904a in vm_call_method_each_type /media/test/ruby/build/./vm_insnhelper.c:4776:
16
#12 0x64f417b28b13 in vm_call_method /media/test/ruby/build/./vm_insnhelper.c
#13 0x64f417af0539 in vm_sendish /media/test/ruby/build/./vm_insnhelper.c:5995:15
#14 0x64f417af0539 in vm_exec_core /media/test/ruby/build/./insns.def:851:11
#15 0x64f417ae5cd7 in rb_vm_exec /media/test/ruby/build/./vm.c
#16 0x64f4177a1bf0 in rb_ec_exec_node /media/test/ruby/build/./eval.c:281:9
#17 0x64f4177a1bf0 in ruby_run_node /media/test/ruby/build/./eval.c:319:30
#18 0x64f41779d2b0 in rb_main /media/test/ruby/build/./main.c:42:12
#19 0x64f41779d2b0 in main /media/test/ruby/build/./main.c:62:12
#20 0x72d96ba2a1c9 in __libc_start_call_main csu/./sysdeps/nptl/libc_start_call_main.h:58:16
#21 0x72d96ba2a28a in __libc_start_main csu/./csu/libc-start.c:360:3
#22 0x64f4176c3d94 in _start (/media/test/ruby/build/ruby+0x14bd94) (BuildId: 5c3c6444d00499cf0254892dbef6454db4a9698a)

0x52f00000e410 is located 16 bytes inside of 49152-byte region [0x52f00000e400,0x52f00001a400)
freed by thread T0 here:
#0 0x64f41775e94a in free (/media/test/ruby/build/ruby+0x1e694a) (BuildId: 5c3c6444d00499cf025
```

```

4892dbef6454db4a9698a)
#1 0x64f4177c944b in rb_gc_impl_free /media/test/ruby/build/./gc/default/default.c:8099:9
#2 0x64f4177c944b in ruby_sized_xfree /media/test/ruby/build/./gc.c:5225:13
#3 0x64f4177c944b in ruby_xfree /media/test/ruby/build/./gc.c:5236:5
#4 0x64f417811e09 in hash_st_free /media/test/ruby/build/./hash.c:1218:5
#5 0x64f417811e09 in rb_hash_rehash /media/test/ruby/build/./hash.c:2026:9
#6 0x64f417b409db in vm_call_cfunc_with_frame_ /media/test/ruby/build/./vm_insnhelper.c:3798:
11
#7 0x64f417b2904a in vm_call_method_each_type /media/test/ruby/build/./vm_insnhelper.c:4776:1
6
#8 0x64f417b28b13 in vm_call_method /media/test/ruby/build/./vm_insnhelper.c
#9 0x64f417aed6f3 in vm_sendish /media/test/ruby/build/./vm_insnhelper.c:5995:15
#10 0x64f417aed6f3 in vm_exec_core /media/test/ruby/build/./insns.def:899:11
#11 0x64f417ae5cd7 in rb_vm_exec /media/test/ruby/build/./vm.c
#12 0x64f417b5bdcc in invoke_iseq_block_from_c /media/test/ruby/build/./vm.c:1653:12
#13 0x64f417b5bdcc in invoke_block_from_c_bh /media/test/ruby/build/./vm.c:1667:20
#14 0x64f417b0e2a7 in vm_yield_with_cref /media/test/ruby/build/./vm.c:1704:12
#15 0x64f417b0e2a7 in vm_yield /media/test/ruby/build/./vm.c:1712:12
#16 0x64f417b0e2a7 in rb_yield_0 /media/test/ruby/build/./vm_eval.c:1361:12
#17 0x64f417b0e2a7 in rb_yield_values /media/test/ruby/build/./vm_eval.c:1400:16
#18 0x64f417823db5 in rb_hash_update_block_callback /media/test/ruby/build/./hash.c:4148:31
#19 0x64f417823d48 in rb_hash_update_block_callback_insert /media/test/ruby/build/./hash.c:41
57:1
#20 0x64f4178225c7 in tbl_update_modify /media/test/ruby/build/./hash.c:1696:15
#21 0x64f4179f9bea in rb_st_update /media/test/ruby/build/./st.c:1498:14
#22 0x64f417814018 in rb_hash_stlike_update /media/test/ruby/build/./hash.c:1686:12
#23 0x64f417814018 in tbl_update /media/test/ruby/build/./hash.c:1727:15
#24 0x64f417823d09 in rb_hash_update_block_i /media/test/ruby/build/./hash.c:4162:5
#25 0x64f417810576 in hash_ar_foreach_iter /media/test/ruby/build/./hash.c:1302:18
#26 0x64f417810576 in ar_foreach_check /media/test/ruby/build/./hash.c:944:22
#27 0x64f417810576 in hash_foreach_call /media/test/ruby/build/./hash.c:1435:15
#28 0x64f4177a45c6 in rb_ensure /media/test/ruby/build/./eval.c:1074:18
#29 0x64f417810329 in rb_hash_foreach /media/test/ruby/build/./hash.c:1463:9
#30 0x64f41781b88f in rb_hash_update /media/test/ruby/build/./hash.c:4219:13
#31 0x64f417b409db in vm_call_cfunc_with_frame_ /media/test/ruby/build/./vm_insnhelper.c:3798
:11
#32 0x64f417b2904a in vm_call_method_each_type /media/test/ruby/build/./vm_insnhelper.c:4776:
16
#33 0x64f417b28b13 in vm_call_method /media/test/ruby/build/./vm_insnhelper.c
#34 0x64f417af0539 in vm_sendish /media/test/ruby/build/./vm_insnhelper.c:5995:15
#35 0x64f417af0539 in vm_exec_core /media/test/ruby/build/./insns.def:851:11
#36 0x64f417ae5cd7 in rb_vm_exec /media/test/ruby/build/./vm.c
#37 0x64f4177a1bf0 in rb_ec_exec_node /media/test/ruby/build/./eval.c:281:9
#38 0x64f4177a1bf0 in ruby_run_node /media/test/ruby/build/./eval.c:319:30
#39 0x64f41779d2b0 in rb_main /media/test/ruby/build/./main.c:42:12
#40 0x64f41779d2b0 in main /media/test/ruby/build/./main.c:62:12
#41 0x72d96ba2a1c9 in __libc_start_call_main csu/./sysdeps/nptl/libc_start_call_main.h:58:16
#42 0x72d96ba2a28a in __libc_start_main csu/./csu/libc-start.c:360:3
#43 0x64f4176c3d94 in _start (/media/test/ruby/build/ruby+0x14bd94) (BuildId: 5c3c6444d00499cf
0254892dbef6454db4a9698a)

previously allocated by thread T0 here:
#0 0x64f41775ebe3 in malloc (/media/test/ruby/build/ruby+0x1e6be3) (BuildId: 5c3c6444d00499cf0
254892dbef6454db4a9698a)
#1 0x64f417805df5 in rb_gc_impl_malloc /media/test/ruby/build/./gc/default/default.c:8114:5
#2 0x64f4177d49f2 in ruby_xmalloc_body /media/test/ruby/build/./gc.c:5116:12
#3 0x64f4177d49f2 in ruby_xmalloc /media/test/ruby/build/./gc.c:5106:34
#4 0x64f4179f44a1 in rb_st_init_existing_table_with_size /media/test/ruby/build/./st.c:559:39
#5 0x64f4179f65b0 in rb_st_init_table_with_size /media/test/ruby/build/./st.c:585:5
#6 0x64f4179f65b0 in rebuild_table /media/test/ruby/build/./st.c:753:19
#7 0x64f4179f65b0 in rebuild_table_if_necessary /media/test/ruby/build/./st.c:1125:9
#8 0x64f4179f6f6b in st_add_direct_with_hash /media/test/ruby/build/./st.c:1187:5
#9 0x64f4179f9cf3 in rb_st_update /media/test/ruby/build/./st.c:1502:13
#10 0x64f417814018 in rb_hash_stlike_update /media/test/ruby/build/./hash.c:1686:12
#11 0x64f417814018 in tbl_update /media/test/ruby/build/./hash.c:1727:15
#12 0x64f417813e82 in rb_hash_aset /media/test/ruby/build/./hash.c
#13 0x64f417814510 in rb_hash_set_pair /media/test/ruby/build/./hash.c:3715:5

```

```

#14 0x64f417aelbf3 in vm_yield_with_cfunc /media/test/ruby/build/./vm_insnhelper.c:5161:11
#15 0x64f417b5b7f9 in invoke_block_from_c_bh /media/test/ruby/build/./vm.c:1672:16
#16 0x64f417b0dcca in vm_yield_with_cref /media/test/ruby/build/./vm.c:1704:12
#17 0x64f417b0dcca in vm_yield /media/test/ruby/build/./vm.c:1712:12
#18 0x64f417b0dcca in rb_yield_0 /media/test/ruby/build/./vm_eval.c:1361:12
#19 0x64f417b0dcca in rb_yield /media/test/ruby/build/./vm_eval.c
#20 0x64f4179371c7 in range_each_fixnum_loop /media/test/ruby/build/./range.c:1059:9
#21 0x64f4179371c7 in range_each /media/test/ruby/build/./range.c:1096:16
#22 0x64f417b53fd5 in vm_call0_cfunc_with_frame /media/test/ruby/build/./vm_eval.c:164:15
#23 0x64f417b53fd5 in vm_call0_cfunc /media/test/ruby/build/./vm_eval.c:178:12
#24 0x64f417b53fd5 in vm_call0_body /media/test/ruby/build/./vm_eval.c:229:15
#25 0x64f417b57a0a in vm_call0_cc /media/test/ruby/build/./vm_eval.c:101:12
#26 0x64f417b57a0a in rb_call0 /media/test/ruby/build/./vm_eval.c:571:12
#27 0x64f417b0f5f5 in rb_call /media/test/ruby/build/./vm_eval.c:890:12
#28 0x64f417b0f5f5 in iterate_method /media/test/ruby/build/./vm_eval.c:1545:12
#29 0x64f417b0fbf5 in rb_iterate0 /media/test/ruby/build/./vm_eval.c:1487:18
#30 0x64f417b0f287 in rb_iterate_internal /media/test/ruby/build/./vm_eval.c:1519:12
#31 0x64f417b0f287 in rb_block_call_kw /media/test/ruby/build/./vm_eval.c:1568:12
#32 0x64f417b0f287 in rb_block_call /media/test/ruby/build/./vm_eval.c:1554:12
#33 0x64f417dad5e0 in enum_hashify_into /media/test/ruby/build/./enum.c:743:5
#34 0x64f417dad5e0 in enum_hashify /media/test/ruby/build/./enum.c:750:12
#35 0x64f417dad5e0 in enum_to_h /media/test/ruby/build/./enum.c:791:12
#36 0x64f417b409db in vm_call_cfunc_with_frame_ /media/test/ruby/build/./vm_insnhelper.c:3798
:11
#37 0x64f417b2904a in vm_call_method_each_type /media/test/ruby/build/./vm_insnhelper.c:4776:
16
#38 0x64f417b28b13 in vm_call_method /media/test/ruby/build/./vm_insnhelper.c
#39 0x64f417af0539 in vm_sendish /media/test/ruby/build/./vm_insnhelper.c:5995:15
#40 0x64f417af0539 in vm_exec_core /media/test/ruby/build/./insns.def:851:11
#41 0x64f417ae5cd7 in rb_vm_exec /media/test/ruby/build/./vm.c
#42 0x64f4177a1bf0 in rb_ec_exec_node /media/test/ruby/build/./eval.c:281:9
#43 0x64f4177a1bf0 in ruby_run_node /media/test/ruby/build/./eval.c:319:30
#44 0x64f41779d2b0 in rb_main /media/test/ruby/build/./main.c:42:12
#45 0x64f41779d2b0 in main /media/test/ruby/build/./main.c:62:12
#46 0x72d96ba2a1c9 in __libc_start_call_main csu/./sysdeps/nptl/libc_start_call_main.h:58:16
#47 0x72d96ba2a28a in __libc_start_main csu/./csu/libc-start.c:360:3
#48 0x64f4176c3d94 in _start (/media/test/ruby/build/ruby+0x14bd94) (BuildId: 5c3c6444d00499cf
0254892dbef6454db4a9698a)

```

SUMMARY: AddressSanitizer: heap-use-after-free /media/test/ruby/build/./st.c:1508:23 in rb_st_update

Shadow bytes around the buggy address:

```

0x52f00000e180: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
0x52f00000e200: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
0x52f00000e280: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
0x52f00000e300: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
0x52f00000e380: fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa fa
=>0x52f00000e400: fd fd[fd]fd fd fd fd fd fd fd fd fd fd fd fd fd
0x52f00000e480: fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd
0x52f00000e500: fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd
0x52f00000e580: fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd
0x52f00000e600: fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd
0x52f00000e680: fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd fd

```

Shadow byte legend (one shadow byte represents 8 application bytes):

```

Addressable:                00
Partially addressable: 01 02 03 04 05 06 07
Heap left redzone:          fa
Freed heap region:          fd
Stack left redzone:         fl
Stack mid redzone:          f2
Stack right redzone:        f3
Stack after return:         f5
Stack use after scope:      f8
Global redzone:             f9
Global init order:          f6
Poisoned by user:           f7
Container overflow:          fc

```

```

Array cookie:          ac
Intra object redzone:  bb
ASan internal:         fe
Left alloca redzone:   ca
Right alloca redzone:  cb
==227694==ABORTING
triaged/hash_update.rb:3: [BUG] ASAN error
ruby 3.5.0dev (2025-05-13T08:35:34Z master a6435befa7) +PRISM [x86_64-linux]

-- Control frame information -----
c:0003 p:---- s:0011 e:000010 CFUNC  :update
c:0002 p:0029 s:0006 e:000005 EVAL   triaged/hash_update.rb:3 [FINISH]
c:0001 p:0000 s:0003 E:000be0 DUMMY  [FINISH]

-- Ruby level backtrace information -----
triaged/hash_update.rb:3:in '<main>'
triaged/hash_update.rb:3:in 'update'

-- Threading information -----
Total ractor count: 1
Ruby thread count for this ractor: 1

-- C level backtrace information -----
./ruby(__interceptor_backtrace) [0x64f4177086aa]
/media/test/ruby/build/ruby(rb_print_backtrace+0x14) [0x64f417e7bc97] /media/test/ruby/build/./vm_dump.c:843
/media/test/ruby/build/ruby(rb_vm_bugreport) /media/test/ruby/build/./vm_dump.c:1175
/media/test/ruby/build/ruby(rb_bug_without_die_internal+0x23c) [0x64f417dd016c] /media/test/ruby/build/./error.c:1097
/media/test/ruby/build/ruby(rb_bug_without_die+0x127) [0x64f417dcfe87] /media/test/ruby/build/./error.c:1106
./ruby(0x64f4177832aa) [0x64f4177832aa]
./ruby(0x64f417763a2f) [0x64f417763a2f]
./ruby(0x64f417766ab5) [0x64f417766ab5]
./ruby(__asan_report_store8) [0x64f417767bdf]
/media/test/ruby/build/ruby(rb_st_update+0xcd5) [0x64f4179fa0d5] /media/test/ruby/build/./st.c:1508
/media/test/ruby/build/ruby(tbl_update+0x139) [0x64f417814019] /media/test/ruby/build/./hash.c:1686
/media/test/ruby/build/ruby(rb_hash_update_block_i+0x3a) [0x64f417823d0a] /media/test/ruby/build/./hash.c:4162
/media/test/ruby/build/ruby(hash_ar_foreach_iter+0x10) [0x64f417810577] /media/test/ruby/build/./hash.c:1302
/media/test/ruby/build/ruby(ar_foreach_check) /media/test/ruby/build/./hash.c:944
/media/test/ruby/build/ruby(hash_foreach_call) /media/test/ruby/build/./hash.c:1435
/media/test/ruby/build/ruby(rb_ensure+0x257) [0x64f4177a45c7] /media/test/ruby/build/./eval.c:1074
/media/test/ruby/build/ruby(rb_hash_foreach+0x23a) [0x64f41781032a] /media/test/ruby/build/./hash.c:1463
/media/test/ruby/build/ruby(rb_hash_update+0xe0) [0x64f41781b890] /media/test/ruby/build/./hash.c:4219
/media/test/ruby/build/ruby(vm_cfp_consistent_p+0x0) [0x64f417b409dc] ./vm_insnhelper.c:3798
/media/test/ruby/build/ruby(vm_call_cfunc_with_frame_) ./vm_insnhelper.c:3800
/media/test/ruby/build/ruby(vm_call_method_each_type+0x27b) [0x64f417b2904b] ./vm_insnhelper.c:4776
./ruby(vm_call_method+0x2d4) [0x64f417b28b14]
/media/test/ruby/build/ruby(vm_sendish+0x11f) [0x64f417af053a] ./vm_insnhelper.c:5995
/media/test/ruby/build/ruby(vm_exec_core) ./insns.def:851
./ruby(vm_exec_loop+0x0) [0x64f417ae5cd8]
/media/test/ruby/build/ruby(rb_vm_exec) /media/test/ruby/build/./vm.c:2626
/media/test/ruby/build/ruby(rb_ec_exec_node+0x53) [0x64f4177a1bf1] /media/test/ruby/build/./eval.c:281
/media/test/ruby/build/ruby(ruby_run_node) /media/test/ruby/build/./eval.c:319
/media/test/ruby/build/ruby(rb_main+0x29) [0x64f41779d2b1] /media/test/ruby/build/./main.c:42
/media/test/ruby/build/ruby(main) /media/test/ruby/build/./main.c:62
/lib/x86_64-linux-gnu/libc.so.6(__libc_start_call_main+0x7a) [0x72d96ba2alca] ./sysdeps/nptl/libc_start_call_main.h:58

```

```
/lib/x86_64-linux-gnu/libc.so.6(call_init+0x0) [0x72d96ba2a28b] ../csu/libc-start.c:360
/lib/x86_64-linux-gnu/libc.so.6(__libc_start_main_impl) ../csu/libc-start.c:347
/lib/x86_64-linux-gnu/libc.so.6(__libc_start_main) (null):0
./ruby(_start) [0x64f4176c3d95]
```

-- Other runtime information -----

* Loaded script: triaged/hash_update.rb

* Loaded features:

```
0 enumerator.so
1 thread.rb
2 fiber.so
3 rational.so
4 complex.so
5 ruby2_keywords.rb
6 set.rb
```

Associated revisions

Revision 49b306ec - 05/15/2025 06:39 AM - nobu (Nobuyoshi Nakada)

[Bug #21333] Prohibit hash modification inside Hash#update block

Revision 8f895758 - 05/24/2025 01:24 AM - nagachika (Tomoyuki Chikanaga)

merge revision(s) 49b306ecb9e2e9e06e0b1590bacc5f4b38169c3c: [Backport #21333]

[Bug #21333] Prohibit hash modification inside Hash#update block

Revision 247b452a - 07/14/2025 08:49 PM - k0kubun (Takashi Kokubun)

merge revision(s) 49b306ecb9e2e9e06e0b1590bacc5f4b38169c3c: [Backport #21333]

[Bug #21333] Prohibit hash modification inside Hash#update block

History

#1 - 05/13/2025 08:33 PM - byroot (Jean Boussier)

The reproduction script seem missing something? \$b is nil here so the script simply fail.

#2 - 05/13/2025 08:33 PM - byroot (Jean Boussier)

```
$a = (1..1337).to_h { |k| [k, k] }
$b = (1..1337).to_h { |k| [k, k * 2] }
$a.update($b) { |k, o, n|
  $a.rehash
}
```

Seem to do the trick.

#3 - 05/13/2025 08:46 PM - byroot (Jean Boussier)

So #update with block isn't considered iteration, so it doesn't increase the iterlevel hence #rehash is mistakenly allowed.

At first sight the fix is to treat #update like an iteration when yielding.

#4 - 05/14/2025 07:16 AM - cyruseyliu (Qiang Liu)

byroot (Jean Boussier) wrote in [#note-3](#):

So #update with block isn't considered iteration, so it doesn't increase the iterlevel hence #rehash is mistakenly allowed.

At first sight the fix is to treat #update like an iteration when yielding.

byroot (Jean Boussier) wrote in [#note-2](#):

```
$a = (1..1337).to_h { |k| [k, k] }
$b = (1..1337).to_h { |k| [k, k * 2] }
$a.update($b) { |k, o, n|
  $a.rehash
}
```

```
}
```

Seem to do the trick.

byroot (Jean Boussier) wrote in [#note-2](#):

```
$a = (1..1337).to_h { |k| [k, k] }  
$b = (1..1337).to_h { |k| [k, k * 2] }  
$a.update($b) { |k, o, n|  
  $a.rehash  
}
```

Seem to do the trick.

My bad. Forgot one line. Here is my poc.

```
$b = {"a" => 1, 1 => "b", 2 => 1}  
$a = (1..1337).to_h { |k| [k, k] }  
$a.update($b) { |k, o, n|  
  $a.rehash  
}
```

#5 - 05/15/2025 04:07 AM - nobu (Nobuyoshi Nakada)

<https://github.com/ruby/ruby/pull/13344>

#6 - 05/19/2025 02:55 AM - nobu (Nobuyoshi Nakada)

- Status changed from Open to Closed

- Backport changed from 3.2: UNKNOWN, 3.3: UNKNOWN, 3.4: UNKNOWN to 3.2: REQUIRED, 3.3: REQUIRED, 3.4: REQUIRED

#7 - 05/22/2025 07:00 AM - Earlopain (Earlopain _)

If this gets backported, please also consider <https://bugs.ruby-lang.org/issues/21357>. This fix caused a different problem, the patch for that can be found in that issue.

#8 - 05/24/2025 01:57 AM - nagachika (Tomoyuki Chikanaga)

- Backport changed from 3.2: REQUIRED, 3.3: REQUIRED, 3.4: REQUIRED to 3.2: REQUIRED, 3.3: DONE, 3.4: REQUIRED

ruby_3_3 [8f895758d9512466e9ec24ce8e588f059c16136c](#) merged revision(s) [49b306ecb9e2e9e06e0b1590bacc5f4b38169c3c](#).

#9 - 07/14/2025 08:49 PM - k0kubun (Takashi Kokubun)

- Backport changed from 3.2: REQUIRED, 3.3: DONE, 3.4: REQUIRED to 3.2: REQUIRED, 3.3: DONE, 3.4: DONE

ruby_3_4 [247b452af3ace2000d27475a0cb05ebecf3bb29c](#) merged revision(s) [49b306ecb9e2e9e06e0b1590bacc5f4b38169c3c](#).