test/ruby/test_io.rb may get stuck with FIBER_USE_NATIVE=0 on Linux

However, test/ruby/test_io.rb seems stuck when FIBER_USE_NATIVE is 0 on my system...

I can reproduce with make optflags="-DFIBER_USE_NATIVE=0 -O0" test-all TESTOPTS="$(git rev-parse --show-cdup)/test/ruby/test_io.rb" on my Ubuntu 17.10, glibc 2.24-12.

Here is a reduced code.
This code don't stop with SIGINT (CTRL+C) so I had to use SIGKILL.

```
$1000.times do |i|
  p i
  r, w = IO.pipe
  w.puts "foo"
  w.close
  rt = Thread.new do
    r.each_char.next
    r.close
  end
  Thread.new {}.join # <= stuck
  rt.join
end
```

GDB showed ALLOCATE_STACK() had entered in infinity loop at get_cached_stack(), static function of glibc.
I guess stack_cache local variable of allocatestack.c of glibc got corrupted.

```
$ gdb --args ./miniruby -v a.rb
(snil) r
Starting program: /home/takira/work/prog/ruby/ruby/tmp/.out.tmp/miniruby -v a.rb
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
[New Thread 0x7f2865b5e700 (LWP 5568)]
ruby 2.5.0dev (2017-09-10 trunk 59457) [x86_64-linux] 0
(snil) [Thread 0x7f8fe2ba4700 (LWP 27769) exited]
51
```

08/31/2022
I've reproduced it with ruby_2_4, ruby_2_3 and ruby_2_2.

Related issues:
Related to Ruby master - Bug #13875: segfault in Enumerable#zip after GC  Closed

Associated revisions
Revision 60384 - 10/23/2017 09:50 PM - normalperson (Eric Wong)
thread_pthread: do not corrupt stack

This fixes stuck test/ruby/test_io.rb with FIBER_USE_NATIVE=0 on GNU/Linux because linked-list pointers used by glibc get corrupted when fiber stacks are copied.

Thanks to wanabe for finding the bug and original patch.

* thread_pthread (native_thread_init_stack): fix stack corruption
  [ruby-core:82737] [Bug #13387]

Revision 12fc8129 - 03/10/2018 02:46 AM - nagachika (Tomoyuki Chikanaga)
merge revision(s) 60384: [Backport #13887]

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* thread_pthread (native_thread_init_stack): fix stack corruption
  [ruby-core:82737] [Bug #13387]

git-svn-id: svn+ssh://ci.ruby-lang.org/ruby/branches/ruby_2_4@62712 b2dd03c8-39d4-4d8f-98ff-823fe69b080e

Revision 62712 - 03/10/2018 02:46 AM - nagachika (Tomoyuki Chikanaga)
merge revision(s) 60384: [Backport #13887]

thread_pthread: do not corrupt stack

This fixes stuck test/ruby/test_io.rb with FIBER_USE_NATIVE=0 on GNU/Linux because linked-list pointers used by glibc get corrupted when fiber stacks are copied.

Thanks to wanabe for finding the bug and original patch.

* thread_pthread (native_thread_init_stack): fix stack corruption
  [ruby-core:82737] [Bug #13387]

Revision ca310ba6 - 03/18/2018 03:27 PM - usa (Usaku NAKAMURA)
merge revision(s) 60384: [Backport #13887]

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* thread_pthread (native_thread_init_stack): fix stack corruption
[ruby-core:82737] [Bug #13387]

Revision 62825 - 03/18/2018 03:27 PM - usa (Usaku NAKAMURA)
merge revision(s) 60384: [Backport #13887]
thread_pthread: do not corrupt stack

This fixes stuck test/ruby/test_io.rb with FIBER_USE_NATIVE=0 on GNU/Linux because linked-list pointers used by glibc get corrupted when fiber stacks are copied.

Thanks to wanabe for finding the bug and original patch.

* thread_pthread (native_thread_init_stack): fix stack corruption
[ruby-core:82737] [Bug #13387]

History

#1 - 09/11/2017 05:51 AM - wanabe (_ wanabe)
- Related to Bug #13875: segfault in Enumerable#zip after GC added

#2 - 09/12/2017 06:08 AM - normalperson (Eric Wong)
Another note, FIBER_USE_NATIVE segfaults with my work-in-progress "thriber" implementation:
http://blade.nagaokaut.ac.jp/cgi-bin/scat.rb/ruby/ruby-core/82756
I guess I'll investigate tomorrow.

#3 - 09/14/2017 08:23 AM - wanabe (_ wanabe)
Another reproduction code is here.

10.times do |i|
  p i
  t = Thread.new { Fiber.new { sleep }.resume }
  Thread.new {}:join
  t.run.join
end

#4 - 09/15/2017 04:38 PM - wanabe (_ wanabe)
I guess cont->machine.stack_src should not contain the under thread_start_func_1() stack.
Because this area will be used and overwritten by pthread, especially stack_list_[add,del] in nptl/allocatestack.c.
If cont_restore_1() copies cont->machine.stack to cont->machine.stack_src, it may be reverted above changes and corrupted stack_cache list structures.

diff --git a/thread_pthread.c b/thread_pthread.c
index 242b48f15d..50ac751763 100644
--- a/thread_pthread.c
+++ b/thread_pthread.c
@@ -841,8 +841,8 @@ native_thread_init_stack(rb_thread_t *th)
   size_t size;

     if (get_stack(&start, &size) == 0) {
-     th->machine.stack_start = start;
-     th->machine.stack_maxsize = size;
+     th->machine.stack_start = &curr;
+     th->machine.stack_maxsize = size - ((char*)start - (char*)&curr);
   }
   #elif defined get_stack_of
     if (!th->machine.stack_maxsize) {
Above patch can prevent the issue.
But I believe it is never correct.
((char*) cast is ugly, I want change cont->machine.stack_src but not th->machine.stack_start, ruby should change the behaviour only when FIBER_USE_NATIVE == 0, and so on.)

#5 - 09/21/2017 10:28 PM - normalperson (Eric Wong)

s.wanabe@gmail.com wrote:

But I believe it is never correct.
((char*) cast is ugly, I want change cont->machine.stack_src but not th->machine.stack_start, ruby should change the behaviour only when FIBER_USE_NATIVE == 0, and so on.)

I guess replacing "char **" with "uintptr_t" is appropriate for pointer arithmetic:

diff --git a/thread_pthread.c b/thread_pthread.c
index 96723d4b17..9f9959e095 100644
--- a/thread_pthread.c
+++ b/thread_pthread.c
@@ -841,8 +841,9 @@ native_thread_init_stack(rb_thread_t *th)
     size_t size;
     if (get_stack(&start, &size) == 0) {
         - th->ec.machine.stack_start = start;
         - th->ec.machine.stack_maxsize = size;
         + uintptr_t diff = (uintptr_t)start - (uintptr_t)&curr;
         + th->ec.machine.stack_start = &curr;
         + th->ec.machine.stack_maxsize = size - diff;
     }
     #elif defined get_stack_of
     if (!th->ec.machine.stack_maxsize) {

The above works for me as far as test_io.rb goes, but my Thriber patch for [Feature #13618] still segfaults with FIBER_USE_NATIVE==0, so I guess that is a separate bug I need to fix...

#6 - 09/23/2017 06:31 PM - normalperson (Eric Wong)

s.wanabe@gmail.com wrote:

I guess cont->machine.stack_src should not contain the under thread_start_func_1() stack.
Because this area will be used and overwritten by pthread, especially stack_list_[add,del] in nptl/allocatestack.c.
If cont_restore_1() copies cont->machine.stack to cont->machine.stack_src, it may be reverted above changes and corrupted stack_cache list structures.

I think this makes your patch necessary for callcc use regardless of FIBER_USE_NATIVE value.

Shall I commit [ruby-core:82925]?

My Thriber patch has a different problem with FIBER_USE_NATIVE=0 and I need to use heap alloccation for platforms without native fiber.

#7 - 09/24/2017 12:10 PM - wanabe (_ wanabe)

normalperson (Eric Wong) wrote:

s.wanabe@gmail.com wrote:

I guess cont->machine.stack_src should not contain the under thread_start_func_1() stack.
Because this area will be used and overwritten by pthread, especially stack_list_[add,del] in nptl/allocatestack.c.
If cont_restore_1() copies cont->machine.stack to cont->machine.stack_src, it may be reverted above changes and corrupted stack_cache list structures.

I think this makes your patch necessary for callcc use regardless of FIBER_USE_NATIVE value.

Shall I commit [ruby-core:82925]?
Thank you for your advice. I didn't care about callcc. Your refined patch [ruby-core:82925] looks good for me, but I want to hear the opinion of Evaluator Maintainer just in case. Sasada-san, how do you think about the issue?

#8 - 09/24/2017 12:10 PM - wanabe (_ wanabe)
- Assignee set to ko1 (Koichi Sasada)

#9 - 10/17/2017 07:32 PM - normalperson (Eric Wong)
  s.wanabe@gmail.com wrote:
  Assignee set to ko1 (Koichi Sasada)
  https://bugs.ruby-lang.org/issues/13887#change-66853

ko1: ping?

#10 - 10/21/2017 02:51 PM - ko1 (Koichi Sasada)
Sorry for missing this ticket. I can't understand it is correct, but I believe you guys. Please commit it. Thank you so much.
I'm not sure why previous versions doesn't have same problem.

#11 - 10/23/2017 09:07 PM - normalperson (Eric Wong)
- Backport changed from 2.2: UNKNOWN, 2.3: UNKNOWN, 2.4: UNKNOWN to 2.2: REQUIRED, 2.3: REQUIRED, 2.4: REQUIRED

Previous versions (2.2, 2.3, 2.4) do have the same problem.

#12 - 10/24/2017 02:54 PM - wanabe (_ wanabe)
- Status changed from Open to Closed

I'm happy to close this issue because of r60384. Thank you.

#13 - 03/10/2018 02:46 AM - nagachika (Tomoyuki Chikanaga)
- Backport changed from 2.2: REQUIRED, 2.3: REQUIRED, 2.4: REQUIRED to 2.2: REQUIRED, 2.3: REQUIRED, 2.4: DONE

ruby_2_4 r62712 merged revision(s) 60384.

#14 - 03/18/2018 03:27 PM - usa (Usaku NAKAMURA)
- Backport changed from 2.2: REQUIRED, 2.3: REQUIRED, 2.4: DONE to 2.2: REQUIRED, 2.3: DONE, 2.4: DONE

ruby_2_3 r62825 merged revision(s) 60384.