

## Ruby master - Bug #3150

### net/https peer verification doesn't do anything

04/15/2010 06:39 PM - hongli (Hongli Lai)

|                        |  |                  |
|------------------------|--|------------------|
| <b>Status:</b>         | Third Party's Issue  |                  |
| <b>Priority:</b>       | Normal   |                  |
| <b>Assignee:</b>       | nahi (Hiroshi Nakamura)  |                  |
| <b>Target version:</b> | 1.9.3  |                  |
| <b>ruby -v:</b>        | ruby 1.8.7 (2009-06-08 patchlevel 173)<br>[universal-darwin10.0] | <b>Backport:</b> |

#### Description

=begin

Setting verify\_mode to VERIFY\_PEER should make net/https raise an exception if peer certificate verification fails. For example:

```
require 'net/http'
require 'net/https'
require 'openssl'

url = URI.parse("https://bugzilla.redhat.com/")
http = Net::HTTP.new(url.host, url.port)
http.use_ssl = true
http.verify_mode = OpenSSL::SSL::VERIFY_PEER

http.verify_callback = proc do |preverify_ok, ssl_context|
  puts "verification succeeded: #{preverify_ok}"
end

request = Net::HTTP::Get.new(url.path)
response = http.request(request) # Should raise error
```

#### Expected output:

```
$ ruby ssltest.rb
verification succeeded: false
.../lib/ruby/1.8/net/http.rb:586:in `connect': certificate verify failed (OpenSSL::SSL::SSLError)
```

#### Actual output:

```
$ ruby ssltest.rb
verification succeeded: false
(no exception raised)
```

Either net/https is broken, or OpenSSL is broken, or OpenSSL changed some default behavior.

I can reproduce the problem OS X Snow Leopard with OpenSSL 0.9.8k and the following Ruby versions:

- ruby 1.8.6 (2010-02-05 patchlevel 399) [i686-darwin10.3.0]
- ruby 1.8.7 (2009-06-08 patchlevel 173) [universal-darwin10.0]
- ruby 1.9.1p376 (2009-12-07 revision 26041) [i386-darwin10.2.0]
- ruby 1.9.2dev (2010-04-09 trunk 27271) [x86\_64-darwin10.3.0]

The problem does not occur on Debian Linux 5 with OpenSSL 0.9.8g and the following Ruby versions:

- ruby 1.8.6 (2008-08-11 patchlevel 287) [i686-linux]

I don't know whether 1.8.6-p287 exhibits the problem on Snow Leopard, it fails to compile with the following errors:

```
gcc -I. -I../.. -I../... -I../.../ext/openssl -DRUBY_EXTCONF_H="extconf.h" -fno-common -g -O2 -pipe -fno-common -c
openssl_missing.c
```

In file included from openssl\_missing.c:22:

```
openssl_missing.h:123: error: conflicting types for 'BN_rand_range'
/usr/include/openssl/bn.h:411: error: previous declaration of 'BN_rand_range' was here
openssl_missing.h:124: error: conflicting types for 'BN_pseudo_rand_range'
```

```
/usr/include/openssl/bn.h:412: error: previous declaration of 'BN_pseudo_rand_range' was here
=end
```

## History

---

### #1 - 08/20/2010 07:10 AM - nahi (Hiroshi Nakamura)

- Assignee set to nahi (Hiroshi Nakamura)

=begin

Anyone can reproduce this? On Snow Leopard only? It must be critical issue if it still exists.

=end

### #2 - 08/20/2010 03:11 PM - tenderlovmaking (Aaron Patterson)

=begin

On Fri, Aug 20, 2010 at 07:12:47AM +0900, Hiroshi NAKAMURA wrote:

Issue [#3150](#) has been updated by Hiroshi NAKAMURA.

Assigned to set to Hiroshi NAKAMURA

Anyone can reproduce this? On Snow Leopard only? It must be critical issue if it still exists.

I am able to reproduce this on Snow Leopard. I will try to debug and provide more info soon!

--

Aaron Patterson

<http://tenderlovmaking.com/>

Attachment: (unnamed)

=end

### #3 - 09/06/2010 11:25 AM - nahi (Hiroshi Nakamura)

=begin

Thanks Aaron. Hope we can identify the cause soon.

=end

### #4 - 09/09/2010 03:42 AM - tenderlovmaking (Aaron Patterson)

=begin

On Mon, Sep 06, 2010 at 11:26:01AM +0900, Hiroshi NAKAMURA wrote:

Issue [#3150](#) has been updated by Hiroshi NAKAMURA.

Thanks Aaron. Hope we can identify the cause soon.

Hi!

I *think* I have good news. I am starting to suspect this is not a bug of Ruby.

First (for posterity), here is a chunk of Ruby code to reproduce the problem without using net/http:

```
require 'socket'
require 'openssl'

s = TCPSocket.new 'bugzilla.redhat.com', 443
ctx = OpenSSL::SSL::SSLContext.new
ctx.verify_mode = OpenSSL::SSL::VERIFY_PEER
s = OpenSSL::SSL::SSLSocket.new s, ctx
s.connect
```

This code raises an exception on my linux machine, but not on my Snow Leopard machine.

I wrote a (mostly) equivalent program in C here:

<http://gist.github.com/570593>

On my Snow Leopard machine, SSL\_connect() returns a value greater than

1. On my linux machine, this program results in an error. This program leads me to believe this is not a bug of Ruby, but I don't know why the behavior is different on linux vs OS X. I am still researching.

--

Aaron Patterson  
<http://tenderlovmaking.com/>

Attachment: (unnamed)  
=end

**#5 - 09/14/2010 04:01 PM - shyouhei (Shyouhei Urabe)**

- Status changed from Open to Assigned

=begin  
=end

**#6 - 09/14/2010 05:20 PM - justincase (Justin Case)**

=begin  
Workaround with rvm:

```
$ openssl version  
OpenSSL 0.9.8l 5 Nov 2009
```

```
$ rvm package install openssl  
$ rvm remove 1.9.2  
$ rvm install 1.9.2 -C --with-openssl-dir=$HOME/.rvm/usr
```

```
$ $HOME/.rvm/usr/bin/openssl version  
OpenSSL 0.9.8n 24 Mar 2010
```

Output:

```
$ ruby ssltest.rb  
verification succeeded: false  
[...] http.rb:677:in `connect': SSL_connect returned=1 errno=0 state=SSLv3 read server certificate B: certificate verify failed  
(OpenSSL::SSL::SSLError)  
=end
```

**#7 - 11/25/2010 08:48 PM - nahi (Hiroshi Nakamura)**

=begin  
I found that the OS X 10.6.5 includes security fix for OpenSSL. <http://support.apple.com/kb/HT4435>  
And it looks similar to this issue for me. Can someone check if the behavior of above scripts changed on 10.6.5?

The ticket I file at developer.apple.com is not yet updated so it could be a different fix.  
=end

**#8 - 11/27/2010 03:16 AM - tenderlovmaking (Aaron Patterson)**

=begin  
On Thu, Nov 25, 2010 at 08:48:59PM +0900, Hiroshi NAKAMURA wrote:

Issue [#3150](#) has been updated by Hiroshi NAKAMURA.

I found that the OS X 10.6.5 includes security fix for OpenSSL. <http://support.apple.com/kb/HT4435>  
And it looks similar to this issue for me. Can someone check if the behavior of above scripts changed on 10.6.5?

The ticket I file at developer.apple.com is not yet updated so it could be a different fix.

I've updated to 10.6.5, and nothing has changed with this. :(

--

Aaron Patterson  
<http://tenderlovmaking.com/>

Attachment: (unnamed)  
=end

**#9 - 11/27/2010 07:51 AM - nahi (Hiroshi Nakamura)**

```
=begin
Thank you for sharing your time. It's bad to know that the problem still exists...
=end
```

**#10 - 01/08/2011 02:59 AM - nbibler (Nathaniel Bibler)**

```
=begin
I tested this again in OS X 10.6.6 yesterday, and the problem still exists. I used Aaron's code from 09/09/2010 03:42 AM and no exceptions were raised.
```

```
ruby 1.9.2p0 (2010-08-18 revision 29036) [x86_64-darwin10.4.0]
=> #OpenSSL::SSL::SSL.Socket:0x000001008470a0
```

```
ruby 1.8.7 (2009-12-24 patchlevel 248) [i686-darwin10.2.0]
=> #OpenSSL::SSL::SSL.Socket:0x1005b3be0
=end
```

**#11 - 01/09/2011 11:44 PM - MartinBosslet (Martin Bosslet)**

```
=begin
Using Ubuntu 10.04 and OpenSSL 1.0.0c, I get the expected exception.
=end
```

**#12 - 03/06/2011 07:20 AM - nahi (Hiroshi Nakamura)**

```
=begin
http://www.afp548.com/article.php?story=20091007164413755 (Thanks for finding this, Eric: https://twitter.com/#!/drbrain/status/43788281007194112)
)
```

Apple looks to ship customized OpenSSL which integrates trusted root certificates from OS's system keychain. So we should test against not <https://bugs.redhat.com/> but another SSL site which is using the certificate OS does not trust.

Hongli, can you confirm that the result of your program affected by OS's keychain setting?  
=end

**#13 - 03/16/2011 09:57 AM - justincase (Justin Case)**

```
=begin
Heh. Actually, without the ((verify_callback)) I get consistent results.
net/https does a ((post_connection_check)) internally when ((use_ssl=true)).
((VERIFY_PEER)) is also automatically set when ((use_ssl=true)) using
1.9.2-p180. Didn't check when that was introduced but on Ruby 1.8.7-p174
you have to explicitly set ((VERIFY_PEER)).
```

```
require 'net/http'
require 'net/https'
require 'uri'
```

```
url = URI.parse("https://github.com/") # OK
#url = URI.parse("https://etutorials.org/") # Hostname mismatch
http = Net::HTTP.new(url.host, url.port)
http.use_ssl = true
http.verify_mode = OpenSSL::SSL::VERIFY_PEER
request = Net::HTTP::Get.new(url.path)
response = http.request(request)
```

# Result on both Mac OS 10.6.6 and Ubuntu 10.04.1 LTS:

```
=> OpenSSL::SSL::SSLError: hostname was not match with the server
certificate
```

```
(( ))
```

Delving deeper, here's what I found. While I haven't found the root cause, I think this might be interesting.

From the OpenSSL docs:

The `verify_callback` function is used to control the behaviour when the `SSL_VERIFY_PEER` flag is set. It must be supplied by the application and receives two arguments: `preverify_ok` indicates, whether the verification of the certificate in question was passed (`preverify_ok=1`) or not (`preverify_ok=0`).

[...]

The certificate chain is checked starting with the deepest nesting level (the root CA certificate) and worked upward to the peer's certificate. At each level signatures and issuer attributes are checked. Whenever a verification error is found, the error number is stored in `x509_ctx` and `verify_callback` is called with `preverify_ok=0`

[...]

If no error is found for a certificate, `verify_callback` is called with `preverify_ok=1` before advancing to the next level.

[...]

The return value of `verify_callback` controls the strategy of the further verification process. If `verify_callback` returns 0, the verification process is immediately stopped with "verification failed" state. If `SSL_VERIFY_PEER` is set, a verification failure alert is sent to the peer and the TLS/SSL handshake is terminated. If `verify_callback` returns 1, the verification process is continued. If `verify_callback` always returns 1, the TLS/SSL handshake will not be terminated with respect to verification failures and the connection will be established. The calling process can however retrieve the error code of the last verification error using `SSL_get_verify_result(3)` or by maintaining its own error storage managed by `verify_callback`.

Ok. So it's pretty darn important what `(verify_callback)` actually returns. Which in Hongli's test case is `(nil)`! Let's revise `(verify_callback)` so that it returns `(preverify_ok)`:

`()`

Now I get the same end results as before. Note that I say end results because the validation process differs.

Per documentation `(verify_callback)` is called for each certificate in the chain. This seems to happen successfully on Ubuntu but not on OS X.

Running the gist against `(github.com)`:

On Mac OS X 10.6.6 we get:

```
preverify_ok: false
error: 19
=> #
```

On Ubuntu 10.04.1 LTS:

```
preverify_ok: true
error: 0
preverify_ok: true
error: 0
preverify_ok: true
error: 0
preverify_ok: true
error: 0
=> #
```

The error on OS X means "`(X509_V_ERR_SELF_SIGNED_CERT_IN_CHAIN)`": `(self signed certificate in certificate chain)`" which is obviously not the case since the certificate is valid.

Github's certificate chain is 4 deep and on Ubuntu no errors are found while traversing the chain. On OS X the first certificate in the chain couldn't be validated and stops but still makes a connection.

If we now run it against `(etutorials.org)` which has a hostname mismatch:

On Mac OS X 10.6.6 we get:

```
preverify_ok: false
error: 20
OpenSSL::SSL::SSLError: hostname was not match with the server certificate
```



```
* 1: Certificate is not trusted.  
*/  
int X509_verify_cert(X509_STORE_CTX *ctx);
```

So, with the OpenSSL on Snow Leopard, a certificate is trusted if the certificate is trusted by system even if you don't set proper SSL\_CERT\_DIR.

You can see the original report have a verify callback and it reports 'false'. Here's what x509\_apply\_vfy.c is doing:

[http://www.opensource.apple.com/source/OpenSSL098/OpenSSL098-27/src/crypto/x509/x509\\_vfy\\_apple.c](http://www.opensource.apple.com/source/OpenSSL098/OpenSSL098-27/src/crypto/x509/x509_vfy_apple.c)

```
/* Try OpenSSL, if we get a local certificate issue verify against trusted roots */  
ret = X509_verify_cert_orig(ctx);  
if (ret != 1 && (ctx->error & X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT_LOCALLY)) {  
...  
}
```

So even though you return false from verify\_callback, it could be trusted by system if the reason is X509\_V\_ERR\_UNABLE\_TO\_GET\_ISSUER\_CERT\_LOCALLY.

I close this as 'Third Party's Issue.' Yes, it's an *issue* of Snow Leopard.

Please let me know if I am wrong. I'll reopen this.